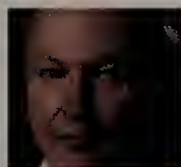


Putting 802.11n to the test

Early adopter says speedy wireless LAN technology exceeding expectations. **Page 14.**



Len Bosack's Next Big Thing

Cisco co-founder is pushing optical networking this time around. **Page 29.**

NETWORKWORLD

The leader in network knowledge ■ www.networkworld.com

August 13, 2007 ■ Volume 24, Number 31

IPv6 goes to the office

Testing shows that applications such as file-sharing and printing work, but expect to make a big training investment. **Page 12.**

Who needs faster Fibre Channel?

That's what some customers are asking as 8Gbps products start to roll out. **Page 16.**

How Cisco finds new \$1B businesses

Emerging Technologies Group uses internal start-up model to exploit market changes. **Page 18.**

Phishing for research

Meet a professor who perpetrates online attacks on unsuspecting Web surfers in the name of improving computer security. **Page 26.**

CLEAR CHOICE TEST WAN acceleration

App acceleration tools live up to the hype

Riverbed bests Cisco, Blue Coat and Silver Peak, but all four products put up impressive performance numbers.



We pounded on these application-acceleration products for seven months in a massive test bed that sent traffic from coast to coast. Any of these products will speed applications, reduce WAN bandwidth and save significant amounts of money. **Page 44**

www.networkworld.com

Keith Shaw goes inside the testing process with Network World Lab Alliance member David Newman (right) in this podcast.



www.nwdocfinder.com/9947

Linux looks to advance via apps, data center

BY JOHN FONTANA

SAN FRANCISCO — Having secured mainstream acceptance, the Linux community stands poised to take on its next challenge: complementing the operating system with the applications, data center technologies and edge devices corporate customers want.

The evidence of what is to come was on display last week at the annual LinuxWorld conference, where 11,000 attendees gathered to check out advances in such technologies as virtualization, management, security and mobile devices, all primed to deliver on the open source promise and build on the Linux momentum.



The message was that Linux clearly has arrived, and now is the time for other projects to build on its success.

But it is not all roses: Linux has yet to crack the desktop in any significant way, the server installed base lags 15 million behind Windows, Sun is biting at the Linux kernel, and there is still plenty of distrust as Microsoft jockeys for its position in the inevitable integration taking place between Windows and Linux at the infrastructure and middleware layers of corporate networks.

Credibility and trust around open source and Linux-based software and appliances independent software vendors (ISV) and

See LinuxWorld, page 18

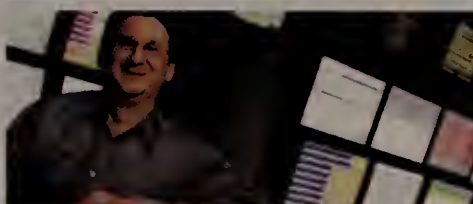
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Optimization recommendations

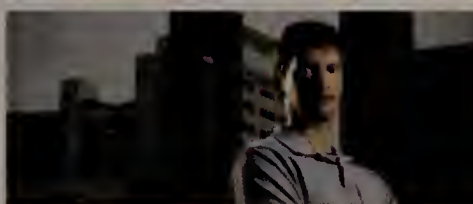
Three top IT shops share real-world strategies for maximizing their data centers and networks



■ Lucasfilm renders big performance boosts to build new blockbusters. **Page 32**



■ CME Globex shaves trading transaction times razor thin. **Page 36**



■ Aurora Health Care finds relief in server centralization, WAN acceleration. **Page 40**

repelling giant spiders. easy.



1. What's making the Spiders so big?

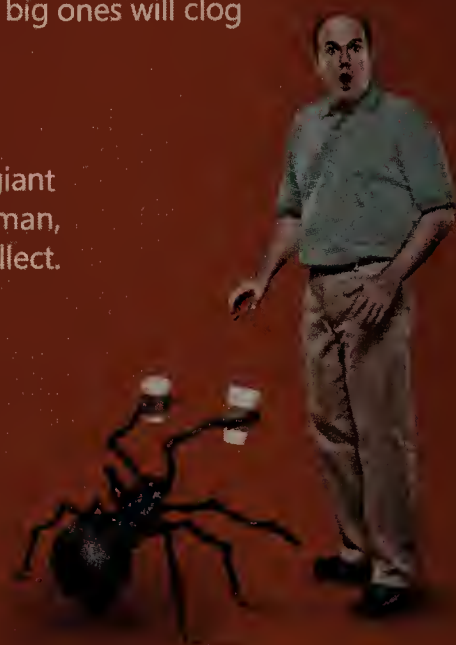
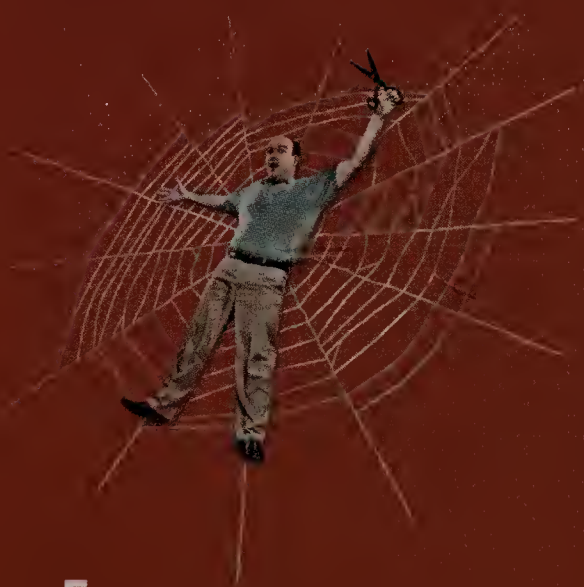
Giant, man-eating Spiders aren't born that way. Find the source of their transformation and you'll know how best to beat them. Is an abandoned chemical plant nearby? Has a strange meteorite recently landed? Exactly how old is the milk in the fridge?

2. Use proven methods.

Spiders are best handled the old-fashioned way: by crushing, smooshing, swatting, etc. Freakishly huge Spiders are no different. Grab a rolled-up newspaper, or simply wad up a handful of toilet paper, and have at it. Unlike normal spiders, though, the big ones will clog your sink, so show caution.

3. Use your superior human intellect.

Spiders are crafty hunters and one of nature's most efficient predators. A giant Spider can be even more intimidating. Remember though, you are a human, and while you may lack razor-sharp pincer jaws, you have the superior intellect. Use a firm hand and some cunning, and the Spider has no chance.

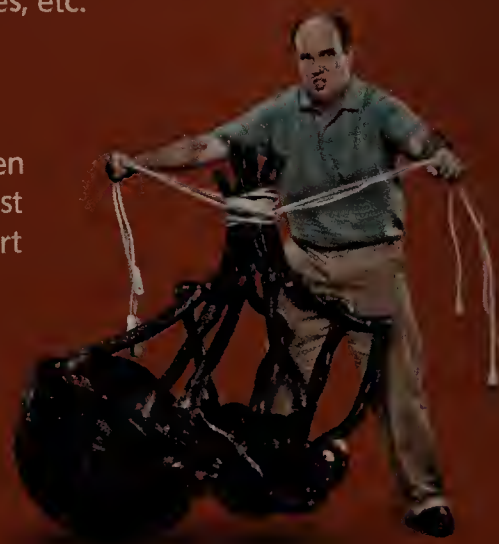


4. Put them to work.

So you've used your superior intellect to vanquish the Spider; why not take it one step further? Use positive reinforcement to train the Spider. Soon you'll have it helping out around the office, running errands, making coffee and copies, etc.

5. Bug spray (a better way).

The world's going green and we're all for saving the environment, so even when faced with rampaging, six-foot tarantulas, try some earth-friendly pest control instead. Mix one drop of peppermint or citronella oil to one quart water, borrow the neighbor's sprayer, and start pumping away.



6. Turn their strength into a weakness.

Eight legs are essential for scurrying over sticky webs. In an office setting, though, they can be a liability. Trip the Spider up with cables, masking tape, or even toilet paper—whatever you have at hand. Once they're tangled, push them over and run like heck.

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NETWORKWORLD

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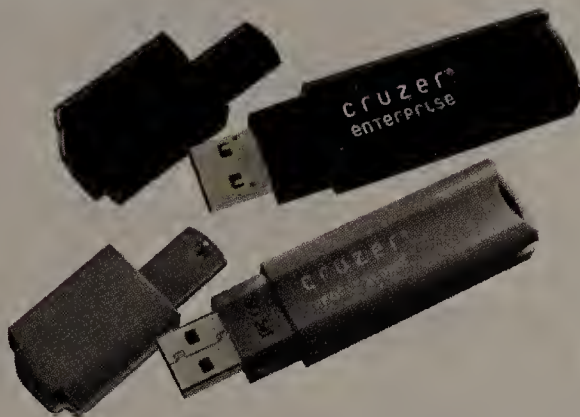
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COOLTOOLS



■ **SanDisk's latest Cruzer Professional and Enterprise USB flash drives** require a password to be accessed. See Cool Tools, page 24.

TECH UPDATE

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- 24 **Mark Gibbs:** Follow-ups and Linux Mint.

NETWORKWORLD.COM

- 8 Catch up on the latest online stories, blogs, newsletters and video.

GOODBADUGLY

Bridge fixes on the way

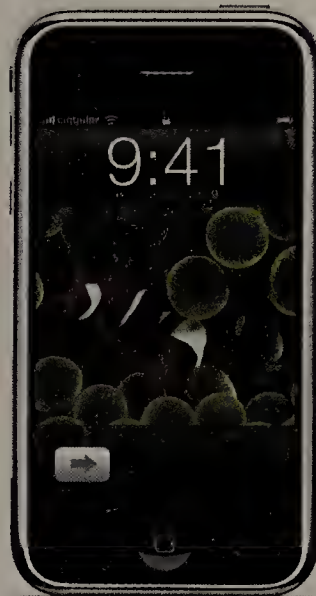
While it's too bad some of these technologies weren't further along, a host of schools, from the University of Michigan to Clarkson University, last week touted wireless sensor and nanotechnology work in their labs that they say could someday prevent such tragedies as the recent Minneapolis bridge collapse.

Cisco's embarrassing little problem

The network giant's Web site went down for a few hours on Wednesday. Cisco said the outage was caused by "an accident during maintenance of a San Jose data center that resulted in a power outage in that facility."

Taking aim at the iPhone ►

A doctor who is headed to prison for defrauding government health insurance programs claims he patented the touchscreen keyboard used by the iPhone and is suing Apple in federal court. The suit reportedly demands a permanent injunction against Apple, as well as damages and attorney's fees.



CLEAR CHOICE TEST

WAN acceleration

■ App acceleration tools
live up
to the hype

■ Riverbed bests Cisco, Blue Coat and Silver Peak, but all four products put up impressive performance numbers.

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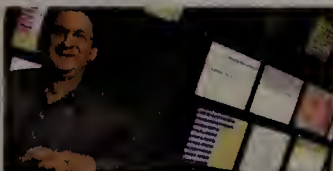
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[yourtakeQ&A] Optimization recommendations

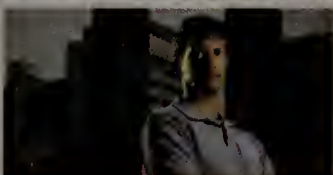
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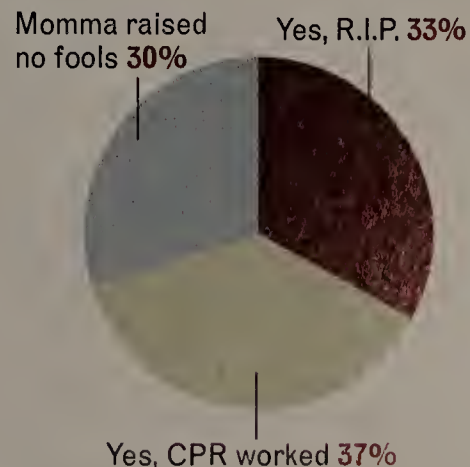


■ Aurora Health Care finds relief in server centralization, WAN acceleration. **Page 40**

POLL

A snapshot of how networkworld.com visitors voted on a key networking issue last week:

Ever dropped a gadget in the sink or worse?



Vote and discuss: www.nwdocfinder.com/9985

PEERSAY

Editor's note: Continue the discussions online. Use the DocFinder URL after the writers' names to join the discussions in which they originally posted their comments.

700MHz protocol issues

Re: "FCC spectrum ruling: Is that all there is?" (www.nwdocfinder.com/9963)

Unless there is a mandate to deploy a single technology in the 700MHz space, there will be a requirement for device manufacturers to support a number of disparate technologies; GSM-[Enhanced Data rates for GSM Evolution]/[Universal Mobile Telecommunications System]/[Code Division Multiple Access]/[Evolution Data Optimized] in one device. What about [High-Speed Downlink Packet Access]/[High-Speed Uplink Packet Access] and [Ultra Mobile Broadband]? Don't forget WiMAX may be a contender as well.

So now I have a device supporting any available technology: at what price and at what performance?

Using your example of the iPhone, Apple needed to add a CDMA chipset to work on Verizon's network. Verizon and AT&T have different wireless protocols.

The question here is why Apple selected GSM only? Cost? Performance?

If you want "open architecture," then you need a single wireless protocol in the United States or devices that support any technology.

Jeffrey Stytz

www.nwdocfinder.com/9964

speeds if there is a 802.11g AP or network device in the network) so those "unbelievable" numbers are no more.

Unless the university plans to force the network to operate at n-only, the results will be less than spectacular once a poor student connects his 802.11b (or g) device to the network. In the end all it takes is one person.

Ivan B

www.nwdocfinder.com/9966

IT on the food chain

Re: "IT: red in tooth and claw" (www.nwdocfinder.com/9967)

Where on the IT food chain do I fit? Good question, and it depends on who you ask.

Ask the CIO or VP and I am a sloth. The CEO probably looks at me as an elephant. Ask the procurement manager, and I am a pig. My employees believe me to be a weasel or a bacterium.

So how come no one sees me as the tiger I really am?

OK, this is embarrassing. The QC tech just walked through, read this response, and left laughing. She said something that sounded like "tiger or Tigger?"

Just wait until I spring on her in the hall, tear out her throat, and drag her into a quiet tree to devour her. . . . Where is a Tigger on the food chain anyway?

Stew

www.nwdocfinder.com/9968

It only takes one bad apple

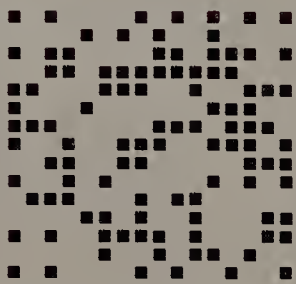
Re: "802.11n wireless LAN tests show 'unbelievable' results at state college" (www.nwdocfinder.com/9965)

What happens if I put up a rogue 802.11b (or g) AP in the building or connect my laptop to the 802.11n network with a b (or g) network card?

It all gets downgraded to b-speeds (or g-

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A knack for NAC

It is very difficult sometimes in the current plethora of NAC vendors to really get back to the true reason for NAC: enforcing the organization's security policy. I always recommend that organizations look at how easily enforcement of their specific security policy can be enforced with the proposed NAC solution. A good NAC solution can not only perform the normal, "standard" host checks, like Windows hotfixes, AV/AS, but also custom checks for software like [a host-based intrusion-prevention system] and encryption software, or even check if unauthorized peer-to-peer or instant-messaging software is installed or running. It is one thing to enforce what the industry thinks NAC should check for, but in the real world your NAC solution should enforce your policy and everything that encompasses that policy!

Jamie Sanbower

www.nwdocfinder.com/9969

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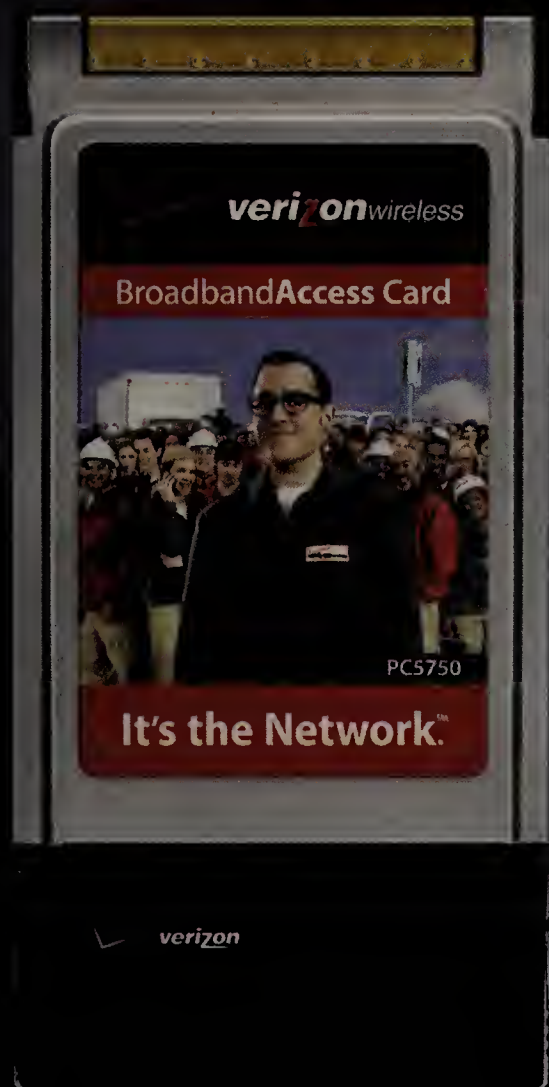
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BLOGOSPHERE

■ Imagine being at the Imagine Cup

Microsoft Subnet blogger Rand Morimoto has been in Seoul, South Korea, since August 3 as a judge of Microsoft's prestigious Worldwide Imagine Cup. Competitors had 24 hours to complete unbelievable tasks, with no sleep. "Okay, well, we're well past 15 hours into the 24-hour competition period, and the competitors are holding up amazingly well! Fortunately one of the sponsors of this event is Coca-Cola Korea, and the hotel staff has been kind enough to keep restocking," he writes. "I did survive eating the pickle sandwich and green-speckled cookie enough to help judge the third milestone round at 5 a.m. here." Get photos, videos and the inside story. www.nwdocfinder.com/9948

■ The bitter Blue Pill

Security expert and Cisco Subnet blogger Jamey Heary asks how would we know if our PCs are infected with the Blue Pill malware? "I found the most interesting, and most deadly, topic to be about virtualized malware, or stealth malware. The most famous rendition of virtualized malware is the Blue Pill project by Joanna Rutkowska. Joanna has been researching this for about 2 years now. This stuff is not theoretical . . . The name Blue Pill (think 'The Matrix' movie) is no accident." www.nwdocfinder.com/9949

■ Get a First Life

Gibbsblog blogger Mike Baska wants the mania around Second Life to chill. He writes: "Linden Labs developed Second Life (2L) as a game, but it's gone nuts. . . . It's not that long ago that a 2L worm was able to steal an avatar's resources, yet millions of people are drawn into 2L and they are spending real money there. IBM has invested \$1M (allegedly) creating a presence in 2L. When does a game stop being a game?" www.nwdocfinder.com/9950

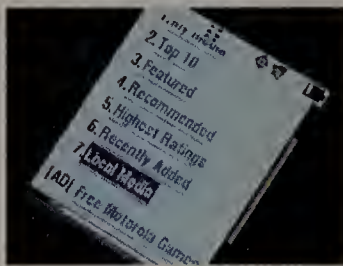
■ Make mine a million

Women-owned businesses face more obstacles than your typical start-up. SMB expert James Gaskin says in the long term, this hurts us all. He writes: "The stereotypical corporate boardroom full of middle-aged white guys still rings true far too often. Hence the continuing need for projects like Count Me In and the Make Mine a Million \$ Business project sponsored by American Express Open and Cisco. The simple premise? Help women-owned businesses grow." www.nwdocfinder.com/9951

INTERVIEWS, THE COOLEST TOOLS AND MORE

ITvVIDEO

COOL TOOLS:



Buzzed about mobile video

Buzzwire offers streamed video and audio without requiring a special client on the phone. Program Director Keith gets the lowdown from Buzzwire CMO John Kelley. www.nwdocfinder.com/9974

NEWS VIDEO:



Defcon nabs undercover TV reporter

Attendees at the Defcon conference discover a "Dateline NBC" producer at the show and escort her from the proceedings. www.nwdocfinder.com/9975

PANORAMA PODCAST:



Why hackers love your apps

Jack Danahy from Ounce Labs talks to Multimedia Editor Jason Meserve about what can be done to shore up custom code from a hacker attack. www.nwdocfinder.com/9976

BEST OF NW'S NEWSLETTERS

Appreciating your SysAdmin

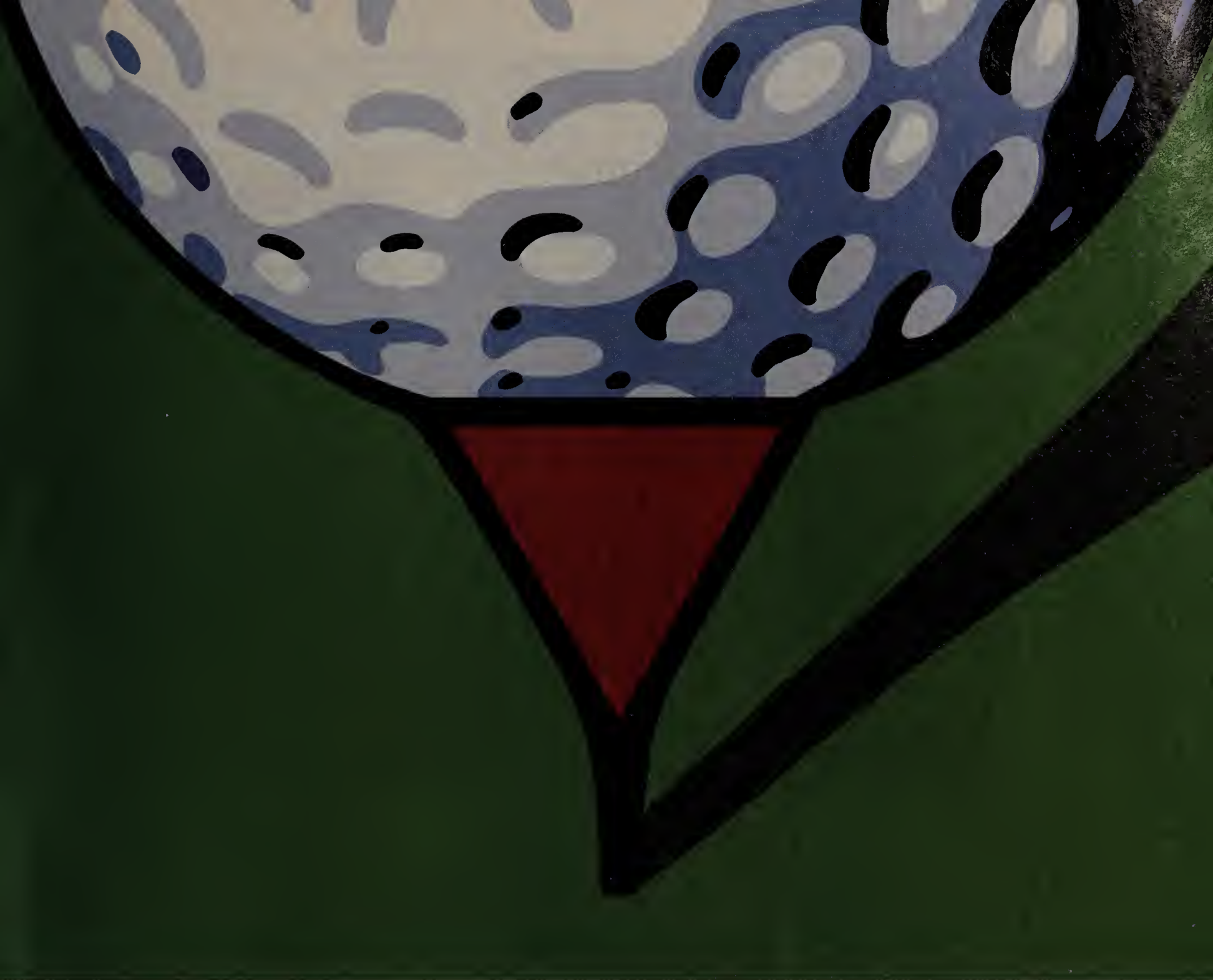
The MPLS total customer experience; Women in IT

Network/systems management: The last Friday of this past July marked the 8th Annual System Administrator Appreciation Day — a day to recognize all the typically unnoticed efforts of systems administrators, network managers, database administrators and other IT professionals. Last year a group of industry organizations and vendors established a contest around the appreciation day, created by Ted Kekatos, naming one among 5,000 nominated IT professionals SysAdmin of the Year. Winner Michael Beck enjoyed the recognition, but the prize — a trip to a Washington, D.C. LISA conference — wasn't really the thrill of a lifetime. The all-expense-paid trip took him just a few miles from his Herndon, Va., workplace. Yet Beck more than appreciated the nod; he was, after all, nominated by his boss and peers. www.nwdocfinder.com/9971

Wide-area networking: With the rollout of MPLS services well under way, researcher Kubernan is in the middle of defining the Total Customer Experience (TCE) for MPLS customers. The TCE is a method of quantifying the overall importance of, and satisfaction with, a number of components of evaluating, purchasing and operating an MPLS network.

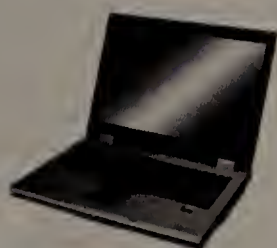
Although the components of the TCE have been identified, their weighting still is being researched. From a top-down approach, the TCE consists of five key areas: current MPLS VPN experience, MPLS VPN buying and evaluation process, delivery and installation of services, support, and billing. www.nwdocfinder.com/9972

IT careers and training: The feedback to our ongoing discussion about certification vs. real-life work experience was very interesting. The thread of the discussion is whether employers now are more likely to give skills bonuses to pros with the right experience even though they may not possess technical certifications. One reader wrote in suggesting that certifications may help women in particular in their technical careers. The reader's e-mail arrived just as CareerBuilder and Kelly Services issued a survey titled "Diversity in the Workplace." It found that one in four female workers have experienced discrimination or unfair treatment at work, including not receiving credit for one's work, not having concerns addressed or taken seriously, feeling ideas or input are generally being ignored, and being overlooked for a promotion. www.nwdocfinder.com/9973



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Active RFID market surging

The use of battery-powered wireless products in tagging and tracking applications is rising sharply, according to a British consulting firm. "Active RFID" uses almost any wireless technology — from short-range 802.15.4 sensor radios to Wi-Fi and cellular — in tags that have a battery or other power source. The tags attach to equipment, vehicles and even livestock, and can be used for asset management and location tracking. By contrast, passive RFID tags rely on the energy from a wireless scan by a tag reader, usually just a few feet away. The surge in interest in active RFID will boost it from about 13% of the total RFID market in 2007, to 26% (or \$7 billion) in 10 years, according to IDTechEx. Fueling the segment's growth is demand for real-time location systems for tracking, finding and monitoring things and people. www.nwdocfinder.com/9981

RSA to buy data-leak detection company

EMC's RSA group plans to acquire data-leak protection vendor Tablus, whose software called Content Sentinel monitors computers to catch when they are used to leak sensitive information. It is one of a growing list of products developed in the past few years to help CIOs demonstrate compliance with federal regulations, such as the Health Insurance Portability and Accountability Act and Sarbanes-Oxley. Tablus has been offering Content Sentinel since early 2004. The acquisition, which is expected to be completed by year-end, dovetails with RSA's plans to develop a full portfolio of products that can be used to secure sensitive corporate information behind the firewall. Financial terms were not disclosed.

www.nwdocfinder.com/9982

Dell to pay \$48.5M to ousted CEO

Dell will pay former CEO Kevin Rollins \$48.5 million for his stock options six months after he resigned in the wake of investor criticism about the vendor losing market share to rival HP. The award is far greater than Rollins' original severance package of \$5 million, to be paid in installments through April 2008. Dell plans to make the new payment within 45 days after filing a long-overdue annual report for its 2007 fiscal year, the company reported in a filing to the Securities and Exchange Commission. However, it is unclear when that will happen, because Dell has already missed deadlines for filing its past three quarterly earnings reports, called Form 10-Qs, and the annual report, Form 10-K. That behavior has earned the company a series of warnings that the Nasdaq stock exchange may stop trading Dell securities. The company says it cannot file the missing papers until it completes an internal audit.

www.nwdocfinder.com/9983

Panel approves supercomputer funding

The National Science Board has authorized funding for two of the world's most powerful supercomputers, one of them capable of

petaflop-speed operations. The National Science Board action allows the National Science Foundation to move forward with the purchase of the systems, but the NSF cannot confirm that IBM will win the contract to build the world's fastest computer at the University of Illinois at Urbana-Champaign, as was reported last week in *The New York Times*, said Leslie Fink, an NSF spokeswoman. The Times reported that documents inadvertently published on NSF's Web site identified IBM as the leading candidate to build a supercomputer called Blue Waters, which would be about 500 times more powerful than most current supercomputers. Blue Waters is expected to go live in 2011, and the National Science Board's decision last week approves funding of \$208 million over four and a half years.

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Cisco beats Q4 earnings expectations

Cisco surpassed analyst expectations again last week when it posted fourth-quarter earnings of \$2.3 billion on sales of \$9.4 billion. The results exceeded analyst estimates of \$9.29 billion in revenue and earnings of \$2.24 billion, according to Thomson Financial. Revenue increased 18% over last year's fourth quarter, and earnings for the same period were up 21.2%. Scientific-Atlanta, acquired in February 2006, contributed \$2.8 billion to net sales for fiscal 2007, compared with \$989 million for fiscal 2006.

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Fujitsu links biometrics with eDirectory

Fujitsu last week introduced a fingerprint reader and a biometric logon kit that integrates with Novell's eDirectory and is designed to tighten user-access control. The biometric logon is designed to replace smart cards, tokens, and user name and password as authentication methods for users. The biometric device is supported on Novell's eDirectory running on Linux, NetWare and Windows. Fujitsu will deliver the fingerprint reader, which connects to a desktop or laptop via a USB port.

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Spotlight WHEN THINGS GO WRONG

AT&T: We didn't censor Pearl Jam.

Rock band Pearl Jam is crying foul after an AT&T Webcast censored politically themed lyrics by lead singer Eddie Vedder, but AT&T said Thursday the editing was a mistake by a contractor. Pearl Jam's Sunday Lollapalooza performance was carried on AT&T's Blue Room site, which provides free videos of concert performances, sporting events and other content. Pearl Jam called for the U.S. government to pass 'Net neutrality rules prohibiting broadband providers from blocking or slowing Web content that uses their pipes.

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Google deletes own blog

Readers of Google's Custom Search Blog were handed a surprise last week when the Web site was temporarily removed from the blogosphere and hijacked by someone unaffiliated with the company. The problem? Google had mistakenly identified its own blog as a spammer's site and handed it over to another person. The change was noticed by the Google Blogoscooped Web site, which discovered that posts on the Custom Search Blog had been deleted and replaced by a strange comment from someone identifying himself as Srikanth.

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Vonage nearly done with work-

arounds. As part of the cleanup after being sued successfully by Verizon, Vonage Holdings has "substantially completed" the deployment of workarounds for two of three VoIP patents claimed by Verizon, Vonage announced last week. Vonage, the largest independent VoIP provider, began deploying the two workarounds about July 1, Chairman and Interim CEO Jeffrey Citron said during a conference call on the company's second-quarter fiscal 2007 earnings. Vonage has completed development on the third workaround, Citron added. The company consulted outside experts to make sure the workarounds do not violate Verizon's patents, he said. Verizon sued Vonage in June 2006, accusing the smaller company of infringing seven of its patents. In March, a federal jury found that Vonage had infringed three Verizon patents and awarded Verizon \$58 million. Vonage has filed an appeal. www.nwdocfinder.com/9980



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Is IPv6 ready for the office?

BY CAROLYN DUFFY MARSAN

Network engineers completed their first-ever test of common enterprise applications over the world's largest IPv6 network this summer, and the results announced last week were mixed.

Experts were able to get basic office functions — file sharing, printing and Web design, for example — working with IPv6, but it wasn't easy. As for e-mail, well, that hasn't even been tested yet.

The 13 companies involved in the testing, including Microsoft, HP and Adobe, discovered that making the transition to IPv6 will require a significant amount of training and time for IT staffs.

"We found that setting up office applications, especially if you had zero IPv6 knowledge, you would have a hard time learning how to set up these servers," says Erica Johnson, senior manager of software applications at the University of New Hampshire's InterOperability Lab (UNH-IOL), which oversaw the IPv6 tests.

"There's going to be a knowledge gap for network administrators and IPv6 developers," Johnson says. "They are going to have a hard time setting up simple servers for IPv6 networks. I definitely see an HR challenge for setting up these office networks."

Testers also discovered major gaps in the availability of IPv6-ready applications, particularly e-mail.

"What really needs to be tested still is e-mail," Johnson says. "Everyone needs e-mail, and we have not seen anything tested on [the multi-vendor Moonv6 test bed] yet. That doesn't mean there aren't e-mail implementations for IPv6, but that means they aren't being outwardly tested yet. This is a major gap for offices to be able to complete transition to IPv6."

UNH-IOL officials also haven't seen any proprietary applications run over Moonv6 yet.

"CRM, billing, inventory, databases — all of these applications are going to have to be verified that they will work over the new Internet," Johnson says. "We also tried to get an IP Multimedia Subsystem architecture to test

voice, video and data over IPv6, but we are not seeing that yet. That's another gap for IPv6 in moving forward."

IPv6 is a long-anticipated upgrade to the Internet's primary communications protocol, known as IPv4. IPv6 has a virtually limitless number of IP addresses, as well as built-in security. On the other hand, IPv4 supports about 4.3 billion addresses, which soon will be exhausted. When all the IPv4 addresses are handed out, ISPs and enterprises will need to support IPv6 on their networks.

The recent round of IPv6 tests was conducted across the Moonv6 backbone, which is the largest permanently deployed multivendor IPv6 network in the world. Managed by UNH-IOL, Moonv6 runs from New Hampshire to California, with links to Europe and Asia. The goal of the recent Moonv6 tests was to see how well common office applications, including Microsoft Vista, Microsoft Longhorn and Adobe Dreamweaver, would perform with IPv6.

"We've done a lot of testing in the past regarding IPv6 routing protocols, infrastructure and the plumbing itself, but we didn't know if it was going to work back home in the office," Johnson says. "We wanted to know if we were going to be able to create files, share files and print files in IPv6. We also wanted to test Web-development tools, because every business needs to be able to create a Web site."

The network engineers conducted their tests in IPv4/IPv6 dual-stack and IPv6-only modes.

"The common office applications were successful," Johnson says. "We transferred files. We used DNS and DHCPv6, as well as printing. We saw that some really important office applications are working today using IPv6."

Johnson admits, however, that it was difficult to get those applications to work, especially for the companies involved in the Moonv6 testing.

"Our UNH-IOL customers are having a hard time setting up these office applications in their labs," Johnson says. "It's quite difficult for them, finding what supports IPv6. . . . That's going to be the system administrator's real challenge: finding out what works with what."

One feature of IPv6 that excited testers is Site Multihoming by IPv6 Intermediation, known as SHIM6. This protocol makes it easier for enterprises to use more than one carrier to increase the reliability of their Internet connections in a technique known as multihoming. SHIM6 provides a more efficient method of multihoming than with IPv4.

UNH-IOL officials hope next to test e-mail implementations of IPv6 applications on Moonv6, but no date has been set for these tests.

"E-mail testing is our biggest target," Johnson says. "We'd also like to test instant messaging and videoconferencing tools. It would be great to stream video." ■

InBrief

Microsoft plans to release security patches Tuesday

Microsoft plans to release nine sets of security patches next week, including six critical updates for Windows, Office, Internet Explorer and its Visual Basic development software. The updates will come as part of Microsoft's regular monthly security-patch process, and will be made available to customers late Tuesday morning, Pacific time. Less-serious updates are also being readied for Windows, Windows Vista, and Microsoft's Virtual PC and Virtual Server software, Microsoft said. With nine sets of patches, August will be a busy month for system administrators. Microsoft released just six updates in July, and has averaged around seven updates per month this year.

Symantec patches critical flaw in Norton Antivirus

A bug in the way Norton Antivirus software uses the ActiveX programming language could cause serious problems for users of Symantec's products. Last week, Symantec patched the flaw warning that a bug in two ActiveX controls used by Symantec's client software could let an attacker run unauthorized software on a victim's computer. Security vendor Secunia rates the problem as "highly critical." The flaw is an "input validation" error, meaning that Norton doesn't properly check the data it's receiving to ensure that it can't be mistaken for malicious commands. Symantec advises these users to run the program's LiveUpdate feature as soon as possible to download the patch.

Under the gun in IPv6 tests

Among the capabilities tested successfully, if not easily, were:

- Network file sharing and transfer with Unix operating systems from Sun, HP, Berkeley Software Distribution and Linux.
- Printing with printers from HP, Xerox and Konica-Minolta, including printing PostScript over such security mechanisms as IPsec and Internet Key Exchange.
- Web design using Adobe Dreamweaver with Microsoft Vista and Longhorn servers and the Apple Mac operating system.
- Microsoft MeetingSpace collaboration tools.
- DNS and Dynamic Host Configuration Protocol (DHCPv6) servers.



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N.Y. college tests first 11n WLAN

BY JOHN COX

The IT staff at Morrisville State College, where the first large-scale Draft 802.11n wireless LAN is being designed, says the beta gear exceeds expectations. The school last week plugged in the first 10 production units of Meru Networks access points.

One issue still facing the college, however, is when and how to upgrade the electrical system for the high-throughput devices, 900 of which will eventually be deployed across campus.

To run 11n simultaneously on both of its radios with 40MHz channels, the Meru AP320 needs 30 watts of power, or double that supplied by Power-over-Ethernet (PoE) products based on the older 802.3af standard. Power injectors and other gear based on the 30-watt 802.3at PoE standard are not available commercially, though evaluation units can be tested.

Meru says its new AP320 can work using 15 watts, and the college plans to run them at that wattage using 20MHz channels with 802.3af power injectors. But there are some trade-offs. The 11n standard specifies the use of two to four antennas, which are used in a technique called multiple input multiple output (MIMO) to break down a data stream into slower sub-streams, each one assigned to a different antenna. At the receiving end, MIMO antennas pull the streams together into one. With 15 watts, the AP320 will use two instead of all three of its antennas in sending and receiving, or a 2x2 instead of a 3x3 configuration in 11n jargon.

Users should still see a 300Mbps data rate, with roughly 150Mbps in throughput, says Keyur Shah, senior product manager for Meru. So why bother with three antennas? "In MIMO, the more streams you have, the more reliable the [overall] stream becomes," Shah says. "The signal quality is better, and the overall guarantee that the signal will reach its destination is higher."

Morrisville plans to move to new 802.3at power systems once these become available.

Tests exceed expectations

The college IT staff has been testing the

Wireless buyer's guide

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Testing out 802.11n

Morrisville State College's test results comparing Meru Networks' 802.11n wireless LAN gear with 802.11g equipment.

Description of test	File size	Client with 802.11g USB	Client with 2.4GHz 802.11n USB	Client with 5GHz 802.11n internal
Windows file upload from laptop to network share	50 MB	3 min. 51 sec.	26 sec.	8 sec.
Windows file download from network share to laptop	50 MB	1 min. 28 sec.	21 sec.	8 sec.
Web file upload from a laptop to server	20 MB	10 min.	2 min. 18 sec.	2 min. 36 sec.
Web file download from a server to laptop	20 MB	20 sec.	8 sec.	6 sec.
Ruckus* double album music download from local server to laptop	164 MB (33 tracks)	2 min. 59 sec.	1 min. 37 sec.	1 min. 15 sec.

* a legal music-download service offered at Morrisville

Meru AP320 access points with a beta version of the Meru code (see graphic) using two antennas in sending and receiving, and 20MHz channels. The 802.11 standard offers the option of combining two such channels to create larger but fewer 40MHz channels for optimal throughput.

"Some of the statistics [from the tests] were just unbelievable," says Jean Boland, vice president of technology services for the college, in Morrisville, N.Y. A 50MB file uploaded from a laptop to a network drive took three minutes and 51 seconds using an 11g connection, but only 26 seconds with 11n, nearly nine times faster.

With 11n, users can expect to see throughput of 100M to 300Mbps, depending on how the access point and client adapter are configured. That compares with 20M to 25Mbps today for 11a and 11g WLANs. In addition, users can expect to see high throughput sustained over longer distances from 11n access points. In tests that began in June, Morrisville network administrators are finding that 11n is delivering on its promise.

The clients in the tests are existing laptops fitted with 2.4GHz 11n USB adapters from Linksys and new Lenovo T61 Thinkpad notebook PCs with built-in Atheros 11n chipsets that can run on both 2.4GHz and 5GHz frequencies.

Morrisville network administrator Matt Barber runs the test in dorms, student rooms, and near active areas where other access

points and equipment operate. His team sets up the access point and clients and each time runs through an identical set of data transfers, using different kinds of files, at specified distances from the access point, so the results can be compared.

Equipping, managing clients

Morrisville plans to equip as many legacy clients as possible with 11n adapters, both in the 2.4GHz and 5GHz bands. If legacy wireless clients, such as 11b or 11g, connect to the 11n access point, it can slow down performance for 11n clients. But Meru's Shaw says that's not as big a problem with Meru's architecture. Unlike nearly all rivals, Meru's controller manages the client association: essentially the Meru code can give each client a preset amount of time to transmit rather than letting them randomly access the radio channel, he says.

The result is that legacy clients, even close to the 11n access point, won't be able to hog it; and an 11n client, transmitting much faster, will be able to pump through much more data during its time window.

The college IT group is searching for 5GHz 11n adapters to test with the access points.

Ranges and rates

As with 11abg, the 11n connection speed drops as distance to the access point increases, but not as much. "We're losing a lot less of

See Morrisville, page 16

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Fibre Channel is speeding up

But customers aren't rushing as 8Gbps products debut

BY DENI CONNOR

With Emulex and QLogic last week airing plans for 8Gbps Fibre Channel products, storage-area networks are about to get faster. But customers we interviewed don't sound too desperate for a speed boost over the 2G and 4Gbps Fibre Channel products they now use.

"While some very I/O-intensive supercomputing needs for 8Gbps Fibre Channel exist, most users' SAN performance is not eclipsing the 2Gbps Fibre Channel they already own," says Michael Passe, storage architect for Beth Israel Deaconess Medical Center in Boston. "Users are only moving to 4Gbps Fibre Channel because manufacturers are moving in that direction. The logical place for 8Gbps Fibre Channel is in the host virtualization space, where you have several virtual hosts vying for the same physical host bus adapter."

Barry Strasnick, CIO for CitiStreet in North Quincy, Mass., says his organization has never come close to hitting constraints with 2Gbps Fibre Channel for financial-services processing for the 12 million participants it serves.

"I know it may sound boring, but realistically the major I/O constraint for us is still 'old-fashioned' disk spindle speed, which is handled by intelligently spreading the load over more spindles," says Strasnick, who uses QLogic host bus adapters and Brocade switches in his SAN.

The new 8Gbps host bus adapters and switches, which will be available next year, will likely be used initially to link Fibre Channel segments, enabling consolidation between storage devices and for such applications as backup and video postproduction that require higher performance. They could be used "to aggregate and allow more servers to attach to a given number of storage ports, to support virtual servers that may have aggregated performance needs and for interswitch links where 4Gbps Fibre Channel is not cutting it yet today," says Greg Schulz, senior analyst with StorageIO.

But at least some customers say that when they do replace their 2G or 4Gbps Fibre Channel infrastructures, they will likely do so with technologies such as iSCSI and 10Gbps Ethernet.

"I have no plans to go to 8Gbps Fibre Channel for the next three years," says Ken Walters, senior director of enterprise platforms at the Public Broadcasting System in Alexandria, Va. Walters uses 4Gbps port modules in his McData Intrepid director-level switch to connect to 4Gbps McData or Brocade edge switches.

STORAGE NETWORK NUMBERS

Fibre Channel switch revenues are expected to exceed \$2 billion by 2008, and the majority of switch and host bus adapter sales will remain at 4Gbps beyond 2010, according to the Dell'Oro Group.

"When I replace this SAN, I will definitely look to iSCSI on 10Gbps Ethernet and hopefully copper Fibre Channel cabling instead of fiber optic," Walters says. "If for some reason that is not workable, but 8Gbps Fibre Channel is, then I would probably go with that."

Beth Israel's Passe does not have plans for 8Gbps Fibre Channel either.

"We are still only using 4Gbps for connections to our newer arrays," Passe says. "We probably will start to deploy iSCSI to support some specific applications and help with our disaster-recovery plans in the coming two years. It would seem that the future of iSCSI with 10Gbps Ethernet is bright, although we don't have 10Gbps Ethernet infrastructure in place here just yet; it will become more affordable and show up in the correct time frame."

Morrisville

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the speed as we move further away, compared to the effect we see in 11g," Barber says.

And the 11n data rate decreases in much smaller increments. The 802.11 standard specifies that data rates decrease by set amounts at certain distances, like steps. "11n has similar behavior, but it has many more steps," Barber says. When clients are very close to the access point, the testers routinely record 280M to 300Mbps. Moving farther away in stages causes the rate to drop to the 240M to 279Mbps range. "In some places, this is faster than if I plugged into the wall [Ethernet jack]," Barber says.

For Morrisville, raw distance is less important than penetration: how well 11n can get through the cinder block and steel that are found in many of the campus' 45-odd buildings. Again, 11n is paying off. "We're seeing this [penetration] more than we expected," Barber says.

Emulex, QLogic plans

Nevertheless, Emulex will introduce 8Gbps PCI Express-based host bus adapters and an embedded I/O controller that offer security, data integrity and virtualization features. The company's LPe12000 host bus adapters, which reside on server blades, and its Embedded I/O Controller, which is built into storage arrays, are expected to be delivered to original storage manufacturers, such as EMC, IBM and HP, by the end of September. The company's 8Gbps products support storage authentication across the SAN using the Fibre Channel Security Protocol and Emulex's BlockGuard technology that checks data integrity.

For its part, QLogic has started testing its 8Gbps SANbox Fibre Channel switches, PCI Express-based SANblade host bus adapters and iSCSI-to-8Gbps Fibre Channel router. It expects to deliver samples to original storage manufacturers by the end of September.

Brocade, which just introduced host bus adapters in May, is expected to ship 8Gbps Fibre Channel HBAs and 10Gbps Ethernet adapters next year. It is not known whether they are currently sampling 8Gbit technology. Cisco did not respond by press time to our requests for its 8Gbps plans.

All vendors' adapters will be backward-compatible with 2G and 4Gbps Fibre Channel.

Emulex and QLogic product families are expected to ship to customers by the first half of 2008 at a 10% to 20% premium over existing 4Gbps products. ■

The greater rate at greater distance means that Morrisville may be able to deploy somewhat fewer 11n access points when the network is fully converted to 11n later this fall.

But the main benefit, Boland says, is that the dense packing of 11n access points and the greater reach of 11n clients means that users will be more likely to find and keep high-throughput connections.

Installing the 11n network is a two-step process for Morrisville. The college already has deployed hundreds of Meru's 802.11abg access points as part of its plan to replace an obsolete campus net. College officials wanted to have the upgrade ready when students start to arrive for the new year later this month.

Those access points eventually will be replaced by the 11n devices as Meru's shipments ramp up. The new access points have an Atheros two-radio chipset that can support all four of the WLAN standards. ■

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Linuxworld

continued from page 1

corporate users are excited by the possibilities.

"Even three years ago, Linux was not even near the data center, and today it is under mission-critical applications and we are just on the front end of that adoption," says Matt Asay, vice president of business development for Alfresco Software, which develops open source enterprise content-management software. "There is still the perception that if you want heavy-duty, you go Solaris or other Unix variants, but I think that is changing to Linux, and to Windows."

Other open source technologies are finding footholds in hot markets, namely virtualization for the data center and mobile devices. IDC forecasts that Linux will capture 36% of the virtual-machine market by 2010.

Open source packages are emerging as alternatives to VMware and Microsoft's forthcoming virtualization add-on for Windows Server 2008. The evidence can be seen in such virtualization platforms as Xen and the

"Software is going to matter in the mobile space, and developers need to have some consistency across platforms. We came to the conclusion that Linux was our alternative."

Christy Wyatt

Vice president of ecosystem and market development for Motorola's mobile business

Kernel Based Virtual Machine (KVM), the first virtualization technology to be part of the mainline Linux kernel (V2.6.20).

Vendors are taking those tools and building commercial implementations, including Novell and Red Hat with Xen, and XenSource offers commercial versions that support both Linux and Windows.

"Virtualization is a big one for us," says Rodd Heaton, computer system analyst for L-3 Communications. The company has increased its Linux server installations by 10% to 15% over the past couple of years in converting from Novell's NetWare to Suse Enterprise Linux. "Our test environment is almost all virtual, and now we are looking at our production environment."

Amazon is using Xen and Linux as part of its Amazon Elastic Compute Cloud (EC2), a Web service that lets users add and subtract computing resources in real time. With EC2, users configure security and network access; start, terminate and monitor any number of their

Server software growth

The installed base of Linux is on the rise, but Windows is proving to be no slouch in the face of competition.

Server operating system	2004	2006	Percentage increase
Windows	14 million	18.8 million	28.5%
Linux	2.9 million	3.8 million	31%

SOURCE: IDC

virtual applications; and pay by the hour and bandwidth consumed.

"In the new model, you pull resources into the moment when you need them, and you release them when you no longer need them," said Werner Vogels, CTO of Amazon Web services during his opening keynote speech.

Another area where Linux has been making a splash is on the edge with mobile devices. Motorola last week announced its MotoMagx Linux-based platform and said that 60% of its handset portfolio will be based on the platform within the next few years. The company already has 9 million Linux-based handsets in use, mostly in Asia.

In addition, Motorola last year helped launch the LiMo Foundation, which will create a common Linux-based mobile-device platform. The belief is that a consistent platform will attract developers who can write applications once and run them on many devices. The group hopes to have its first version out by year-end. Last week, the foundation added Java-based developers Aplix and Celunite, LG Electronics, device software-optimization firm Wind River, and McAfee to its list of core members: NTT Docomo, Panasonic Mobile Communications, Samsung Electronics and Vodafone Group.

With MotoMagx out and the LiMO platform in the works, Motorola is focusing on three application-development environments: Java, a Web-browser user interface based on the Safari rendering engine, and native Linux APIs, so developers can build such applications as Web services, location-based-services, 3-D multiplayer gaming and mobile corporate data.

Motorola also has the open source Eclipse Tools for mobile Linux project it began last year at the Eclipse Foundation to foster development on mobile Linux platforms.

"Software is going to matter in the mobile space, and developers need to have some consistency across platforms," said Christy Wyatt, vice president of ecosystem and market development for Motorola's mobile business. "We came to the conclusion that Linux was our alternative. We can scale it; we can innovate at any level."

The push to making application development easier is a primary theme for Linux in general. "The No. 1 thing that we need on Linux is applications," said Ron Hovsepian,

Novell's CEO, during his day 3 keynote talk at LinuxWorld. "If you look at Windows, their application availability is far and away their biggest advantage," he said. "ISVs go to Microsoft and they know there is one platform." He said Linux needs that, and called on the open source vendor community to support a vendor-neutral effort to standardize ISV certifications.

See LinuxWorld, page 56

How does Cisco predict market transitions?

BY JIM DUFFY

In explaining its enviable success, Cisco likes to boast of its ability to spot market transitions three to five years before they occur. Ever wonder how it does that?

The company's 18-month-old Emerging Technologies Group is charged with incubating potential opportunities and germinating them as Cisco's next \$1 billion business. Four-billion dollars of Cisco's \$6.3 billion R&D budget is the group's asset base with which it funds, staffs and develops four emerging market opportunities per year.

Cisco seeds these efforts using what the company calls an "internal venture framework," says Marthin De Beer, senior vice president of the group.

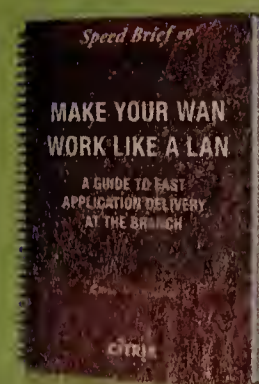
"We see an opportunity and develop it internally in a start-up model," De Beer says. "They are like start-ups but they are not spin-ins" — separate companies started up by Cisco and then "acquired" once they reach certain accomplishments or performance goals. (There have been exceptions to this rule, though, such as Andiamo Systems, a maker of storage switches; and Nuova Systems, a maker of FibreChannel-over-Ethernet products for data centers. Both companies are led by Mario Mazzola, Cisco's former chief development officer and the former head of LAN-switch start-up Crescendo,

See Cisco, page 56

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The spectrum allocation dance: What's next?



EYE ON THE CARRIER
Johna Till Johnson

resale. Carriers resisted the wholesale resale provision, and some also resisted open access.

The story so far: The FCC rejected the wholesale-resale provision, but required Google's open access constraint on about a third of the spectrum.

From a purely scientific standpoint, that's an interesting compromise, because it provides the market with a controlled experiment. Offering virtually identical spectrum to the market under identical economic conditions, but under two different regulatory models, provides factual data on how regulations affect the market.

If — as the free marketers predict, and I agree — open access leads to greater choice and a broader variety of offerings,

Two weeks ago, we talked about the debate over the FCC's planned 700Mhz spectrum auction, scheduled for January. You'll recall that Google had placed a preemptive bid of \$4.6 billion for a chunk of the spectrum, provided the feds adopted two constraints: open access and wholesale

there will be indisputable evidence. And if the contrary is true, we'll see that as well.

Unfortunately, whichever approach proves better will be poor consolation to the folks stuck with the other one — and because the regulations are unlikely to be changed for the foreseeable future, the knowledge we'll have gained regarding which approach is better will remain purely academic.

But the real question at this point is: What happens next? One of the more surreal moments of the debate thus far was the point where both Google and the carriers (chiefly Verizon) threatened to take their bidding dollars and go home. This still makes me chuckle — as if there was any chance that the big telcos and tech firms would miss out on the biggest auction of the decade. Yeah, right.

The most recent indication is that Google will bid anyway, even though it didn't get the terms it wanted. But you may be wondering why a search engine company wants wireless spectrum in the first place.

It all comes back to 'Net neutrality — but not the way you're probably thinking. Google's position on 'Net neutrality is essentially: Do as I say, not as I do. In other words, Google's goal is to make sure carriers will not either refuse to carry from Google's applications (which has never happened,

and is not likely to) or peg fees to the amount and type of traffic Google generates (which carriers are hoping to do in future). To avoid this, Google is looking to become its own carrier — or more accurately, to sub-lease spectrum and subcontract the actual infrastructure buildout to third parties.

But here's the kicker: Google, itself, has no history of adhering to 'Net-neutrality policies (see www.nwdocfinder.com/TOTO for details). So the endgame is having Google in total control of the infrastructure, without officially being a carrier itself, and therefore not subject to 'Net-neutrality regulations. Which, of course, positions Google perfectly to cut off transport services to any future up-and-coming competitors — thereby cementing its dominance in the search market, and securing its advertising revenues.

Of course, Google would never do that. It would be evil.

Johna Till Johnson is president and senior founding partner at Nemertes Research, an independent technology research firm. She can be reached at johna@nemertes.com.

■ **More on the FCC and Google. Get columnist Scott Bradner's take, Page 28.**

The magic of IPv4



USER VIEW
Chuck Yoke

mainframe through the "ether" net I kept talking about.

Somehow I survived that career-challenging meeting and adequately explained basic network connectivity in a way that allowed me to keep my job and purchase the needed routers.

Looking back, there were times when it seemed that there was some magic to data connectivity. Our ability to access files and resources on a computer in another part of the world over telephone lines caused many people to call us network wizards. And with a lexicon of magical terms, such as DECNet, TCP/IP, SNA, NetBEUI, ASCII and IPX, we conjured up connectivity solutions

Early in my network career I had to explain to my boss why we needed head-end routers in the data center. Coming from an application background, he didn't understand data connectivity and thought the packets somehow went directly into the

that verged on miraculous (it was often a miracle they worked at all). However, after 22 years of "conjuring," I can safely say there is nothing magical about networks — with the possible exception of IPv4.

By all reports, IPv4 should be dead. Its limited address space, antiquated security and lack of native authentication mechanisms have generated multitudes of obituaries by industry pundits who proclaimed the new era of IPv6. According to the Merlins of Internet connectivity, IPv6 was required for the widespread adoption of VoIP, B2B extranets and secure Internet connectivity.

After years of defending IPv4, I finally caved in to the overwhelming evidence provided by industry analysts, Internet experts and my own engineering staff. With arms wide open, I stood ready to embrace the future and begin migrating my networks to IPv6.

Now two years later, my arms have grown tired of waiting for something to embrace, my engineering staff has moved on to other jobs, and my network is supporting VoIP, IPSec, SSL, extranets, intranets secure remote access and everything else with antiquated IPv4.

My IPv4 network-addressable devices are

increasing daily, stricter security requirements are being mandated monthly, business-critical voice and data applications are being deployed weekly. I'm communicating with external devices that use the same 10.0.0.0 address space that my networks use, and my NAT appliances are not the traffic bottlenecks they were forecast to be. How can that be?

Some will say this is because of such technology advances as ASICs, faster backplanes, dedicated routing engines and more efficient software that enables IPv4 to overcome its inherent limitations and provide business-critical network connectivity. They will also say that these are interim measures and we still need to be preparing for an eventual migration to IPv6.

That may be, but maybe my old boss was right. Maybe ARPA knew more than we realized. Maybe the Department of Defense did indeed have alien assistance. Maybe there's more to IP subnets than bit-level masking. Maybe there's more magic in IPv4 than we realize ... (cue X-Files theme song).

Yoke is a business solutions engineer for a corporate network in Denver. He can be reached at ckyoke@yahoo.com.

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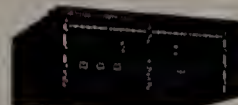
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The state of connection brokering

BY AMIR HUSAIN

Centralized computing is becoming increasingly accepted as an efficient and cost-effective way of deploying desktops in the enterprise, shining a light on the key technologies that make it all possible. Virtualization, for example, allows more than one user to run a desktop session on a centralized server. Another less discussed but perhaps more important component is connection brokering.

One major side effect of centralizing desktop resources is the disembodiment of the PC: The single unit sitting on the desktop is replaced by a small, often solid-state device at the desk that connects back to some sort of computer — whether a blade, a 1U server or a virtual machine — housed in the data center. What was one became at least two, but usually even a greater number of components.

Connection brokering traces its origins to allowing IT administrators to simplify the management of this centralized, “disembodied” PC. Clearly, policies had to be set determining which client device would connect to what server resource. This relationship management is primarily what the early connection brokers did.

The first generally available connection broker was released in 2003. The software allowed administrators to easily create mappings between edge devices and back-end host hardware. When users logged on to their client devices, they would find themselves magically attached to the right data center resource.

The designers of this early-stage brokering software found the new disembodied paradigm created some exciting opportunities. Because the connection to the CPU and storage occurred via IP, in the event of a failure, the broker could play the part of a failover manager, sending the user to a properly functioning resource rather than the initially allocated but now malfunctioning server or blade.

The architecture, in fact, is the equivalent of having a massive virtual KVM switch at your disposal, making it possible to switch from one session to another. This allows developers, quality-assurance engineers, financial-services traders and other power users to gain access instantly to almost unlimited compute power, all from a single, small desktop device.

As the notion of centralized PCs began to heat up, a healthy ecosystem of companies developing software for the market came about. In the interim, virtualization matured substantially and was rapidly entering the desktop arena, having proven itself in the server virtualization and quality-assurance facilitation segments.

Because virtual machines increasingly were being used as desktops running on data-center hardware, the need became paramount for software that could keep track of the myriad possible connections between virtual machines and thin clients. Thus, connection brokers became linked inextricably to

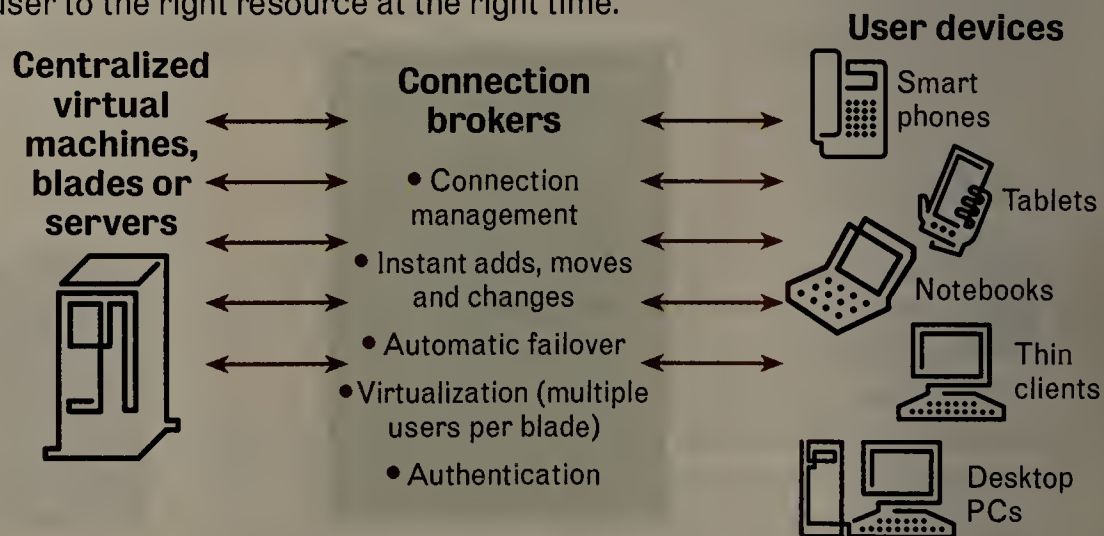
ous. The technology, for example, makes it possible for remote troubleshooters to take over a user session or simply mirror it to help users resolve problems.

If centralized computing becomes the dominant paradigm for PCs in the coming years, as some predict, connection brokers are positioned to become the new resource managers: higher-level operating systems that take on responsibilities for which traditional PC operating systems were not designed.

Future connection brokers will factor in network conditions and geography to determine how connections will be made. Some of them already intelligently allocate least-loaded resources to users, thus managing all centralized PCs as a “single” resource. These

Connection brokers as resource managers

If centralized computing becomes the dominant paradigm for PCs, connection brokers will become the gatekeepers responsible for connecting the right user to the right resource at the right time.



the success of virtual machines as virtual desktops. To address the need, Citrix Systems, the longtime developer of thin-client and remote access software, announced its Virtual Desktop Infrastructure initiative as a solution that would integrate its thin client software with virtualization and connection brokering.

And VMware, the virtualization behemoth, announced it was acquiring a connection broker vendor.

The current state of the art in connection-brokering technology eases the integration of virtualization technologies for desktop. As the centralized model is assimilated, additional areas where connection brokers can add value become increasingly obvi-

capabilities will become more advanced.

Mobile devices, for example, will be supported by future connection brokers as simply another form of client, which maps neatly to visions where storage and compute power exists in unlimited quantities in the cloud, supporting any duly authenticated access device.

Connection brokers then, are poised to be the gatekeepers and decision makers in this environment, operating seamlessly in the background, always connecting the right user to the right resource at the right time.

Amir Husain is CTO of ClearCube Technology. He may be reached at amir.husain@clearcube.com.

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GEARHEAD

Mark Gibbs

Follow-ups and Linux Mint

We'll start with a follow-up to last week's Gearhead (www.nwdocfinder.com/9931) on 2-D bar-coding. Going by what was on the Nextcode Connexio Web site (www.nwdocfinder.com/9932), it looked like Firefox and OS X weren't supported. Amir Rosenberg, the company's CEO, dropped me a note: It turns out that there have been updates, and now Firefox and OS X are supported using a flash component

instead of the original ActiveX component.

On another Gearhead topic — identifying CDs (www.nwdocfinder.com/9933) — reader Matthew Leeds pointed out something I was unaware of: "Gracenote has over 11,000 CDs in its database with the primary genre of DATA. You might also want to take a look through this list (www.nwdocfinder.com/9934), as some of the applications may meet your requirements for a cataloger."

The only application that seems to meet my requirements to catalog data disks is AVCataloger (www.nwdocfinder.com/9935), which is designed not only for cataloging music and data CDs but also videotapes and books. The program also accesses your scanner so you can capture additional data, such as your original receipt. Priced at \$59.95, AVCataloger looks promising.

Leeds wrote a second time regarding the next week's Gearhead on virtual CD drives to suggest that Original CD Emulator (www.nwdocfinder.com/9936) and Noteburner (www.nwdocfinder.com/9937) might be good, legal, DRM-removal tools, albeit they aren't free (both cost \$34.95).

In Gibbsblog a few weeks ago, an Irregular Voice named Miles Baska wrote about the wonders of the Ubuntu Linux distro (www.nwdocfinder.com/9938). Reader John Jasper (from Boston) wrote to sing the

praises of Linux Mint: "...after installing it on my laptop, it has been the absolutely best Linux I have ever used. I have been through countless Linux installations over the many years — starting with Red Hat 5.0. [With Linux Mint, every] piece of hardware and software has worked on the first try — no 'missing dependencies,' etc. Using Mint actually makes me feel lazy — like ...I really didn't have to work to get this running. This is the only Linux I feel is ready for the desktop, and with over 250 desktops in my company, I am really starting to think this would be a real possibility."

Linux Mint, now up to Version 3.0 (www.nwdocfinder.com/9939) — the Cassandra release — comes in two editions. The standard edition, which is compatible with the Ubuntu Feisty Fawn release and its repositories, uses the Linux Kernel 2.6.20 with Gnome 2.18 and comes with the complete version of OpenOffice 2.2, along with all of the usual suspects (Firefox, Thunderbird, Sunbird, Gimp and so on).

The Cassandra Light Edition (www.nwdocfinder.com/9946) is a slimmed-down version of Linux Mint that doesn't contain any proprietary software and excludes patented technologies. So, for example, Macromedia Flash and Windows codecs are missing, and Sun Java is replaced by the GNU Interpreter for Java, which is part of the GNU Compiler for Java (www.nwdocfinder.com/9940).

There are also two beta versions available: The Cassandra XFCE Community Edition Beta 003 replaces the standard edition's Gnome desktop manager (www.nwdocfinder.com/9942) with, you guessed it, the XFCE desktop manager (www.nwdocfinder.com/9943), while the Cassandra KDE Community Edition Beta 013 (www.nwdocfinder.com/9944) substitutes the KDE desktop manager (www.nwdocfinder.com/9945).

So many choices, so little time. Tell me about it at gearhead@gibbs.com.



Keith Shaw

COOLTOOLS

USB drives get serious about security

The scoop: Cruiser Professional (1GB) and Cruiser Enterprise (1GB) USB 2.0 flash drives, by SanDisk, about \$60 and \$70, respectively.

What they are: The USB flash drive has been around for a long time, but enterprises often have

been wary of giving them to users because of lackluster security features. If a user puts mission-critical data on the drive and it gets lost, that's a huge security breach that many companies don't want to deal with. SanDisk aims to alleviate this problem with its latest Cruiser Professional and Enterprise USB flash drives, which include capacities from 1GB to 4GB. The devices include hardware-based 256-bit AES security to guarantee that data stored on them can't be accessed without a password. Both versions provide 24Mbps read speeds and 20Mbps write speeds, and are compatible with USB 2.0 ports and earlier versions.

Why they're cool: The Professional version, aimed more at small-to-midsized businesses or individual users, has software that lets users create a public and private partition, with the amount of space dedicated to each partition being optional. The private partition then can be accessed only with a correct password. This gives users some flexibility in sharing noncritical files and folders without having to go through the extra step of a password.

The Enterprise version, however, has mandatory password protection for all files stored on it, with no way to bypass this requirement. In fact, strong passwords are required — I was told that my first password attempt was lame (my words, not theirs) — the password



One of these USB drives is more secure than the other.

had to have between six and 16 letters and include at least one of three categories (uppercase letter, lowercase letter, number or special characters).

The software also includes a lock-down mode that shuts off access when a set number of incorrect password attempts are made. The Enterprise version also can be integrated with the company's Central Management and Control software, which lets IT departments centrally manage company-issued Cruiser Enterprise devices.

Some caveats: The Professional version has a feature called "trust this computer," which lets users bypass typing in a password to the private partition if they are connecting the drive to a trusted computer (such as at work or at home). This may be a nice convenience, but it opens up a small security hole.

Also, let's be clear here — a password alone may not be entirely secure — users who aren't good at remembering passwords might just write it down on a piece of paper and tape it onto the drive.

Bottom line: Any company (regardless of size) concerned with protecting data stored on USB drives should pay the extra money for the Enterprise version to get the mandatory password features and not have the trust-this-computer loophole on the Professional version.

Grades: Professional, ★★★★★; Enterprise, ★★★★★

Want to ask Keith a personal technology or gadget-related question? Chat live with him this Friday, Aug. 17, at 2 p.m. EDT. Go to www.networkworld.com/chat for more details. Join the discussion!



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Phishing for the good guys

Researcher executes online attacks aimed at improving security

BY JON BRODKIN

If he weren't so ethical, Markus Jakobsson could be a world-class online fraudster. In a way, he already is.

Jakobsson, a cybersecurity researcher and professor at Indiana University in Bloomington, spends much of his time perpetrating online attacks on unsuspecting Web surfers — without actually harming them, of course — to see what types of ruses people will fall for and to predict potential new techniques phishers might pursue.

The university that gave the world the famous sex researcher Alfred Kinsey is more than willing to tolerate experiments that might improve computer security, even if it annoys a few unwitting participants.

"They think everything that is not immoral or illegal is fine," Jakobsson joked last Wednesday at the Usenix Security Symposium in Boston, while delivering a talk on the human factor in such online frauds as phishing, click fraud and crimeware. Victims of online attacks often give up personal information, such as bank account details, or have their computers controlled remotely by hackers.

Jakobsson's research subjects can't know they're being experimented on, or the results would be meaningless. The typical procedure is to tell them about the research after they've unknowingly participated, which Jakobsson admits has led to some angry responses.

In one experiment, Jakobsson and his students sent e-mails to about 20 people directing them to a site authenticated only by a self-signed certificate — an identity certificate signed by its creator. Many accepted the certificate even though anyone knowledgeable about computer security should not have.

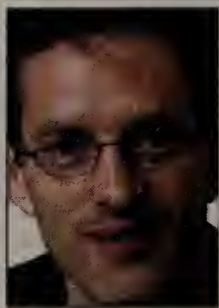
"We were on four continents within a day with a starting point of 20 of these messages," Jakobsson said. "We could have put malware on computers."

In another study, Jakobsson found that although people often won't click on a suspicious link within an e-mail, they will go to the site if they are instructed to copy and paste the same URL into their browsers. The lesson Jakobsson took from the study — which involved an e-mail asking users to update their eBay accounts — is that public education efforts about the danger of online attacks are insufficient. People know they're not supposed to click on suspicious links, but they haven't been told not to copy and paste the same links into an address bar. A slight change in approach causes victims to let their guard down and pays dividends for the bad guys.

Jakobsson also found a problem related to the credit-card company practice of identifying users by the last four digits of their account numbers, which are random. His research shows people are willing to respond to fraudulent e-mails if the attacker

from an eBay user. Instead, the victim — or, in this case, research subject — is taken to a site with a URL that's similar to eBay's but that is run by Jakobsson.

The researchers spoke with eBay after performing their experiment.



"We were on four continents within a day with a starting point of 20 of these messages. We could have put malware on computers."

Markus Jakobsson

Cybersecurity researcher and professor, Indiana University, describing experiments he and his students conducted.

correctly identifies the first four digits of their account numbers, even though the first four are not random but based on the organization that issued the card. "People think [the phrase] 'starting with' is just as good as 'ending with,' which of course is remarkable insight," he said.

Another experiment targeted Indiana University professors, prompting them to use their university-issued passwords to get onto a site that appeared to be hosted outside of the school. Most were duped.

"We sent them to a page that said 'service temporarily unavailable, please try again later. That would stimulate people's interest and many people returned," he said. "It was nice to see that computer scientists never fell for the experimental attack when it was sent by a stranger. . . . It was a wake-up call that the people in the School of Education did not distinguish whether it was from a friend or someone unknown to them."

One finding could have been predicted by anyone: Men are more likely to click on a link sent to them by a female than on one sent by a male. The study also dug up some more surprising facts by targeting e-mail addresses from a social networking site that listed political affiliations. "It was delightful for me to see that people on the far left and far right were much more vulnerable than people in the middle, which confirms to me that they're crazier than the rest of us," Jakobsson said.

In another study, Jakobsson and his wife exposed weaknesses in eBay's system that allows communication between buyers and sellers. A recipient of an e-mail sees a yellow button that says "respond now," but the button carries no information about the intended recipient. Jakobsson pasted the button onto a spoofed e-mail to a victim, making it appear to be a legitimate e-mail

"Just a few months after we performed this experiment and told them the results, this attack started to happen in the wild, pretty big-scale, too," he said. "We were terrified that we caused it to happen."

It turned out the same type of attack had been occurring already, but on a smaller scale, so Jakobsson was off the hook. He said eBay officials reacted positively to his research because it gives them information that can help improve security. For reasons related to public relations, eBay doesn't experiment on its own customers, he said.

There are several good reasons to perform such experiments, Jakobsson argues. They improve phishing countermeasures by discovering what works and what doesn't. Jakobsson said one experiment showed 400 subjects one of two AT&T links: one with the company name in the URL or one with the phrase "accountonline.com."

The accountonline.com link was the real one used by AT&T — yet users deemed it less trustworthy than the one with AT&T's name in the URL. Phishers seem to know this already, as they tend to register domain names that resemble the name of the site they want people to think they are logging on to.

"Custom name attacks are remarkably successful," Jakobsson said.

Experiments can help researchers predict trends by discovering what human vulnerabilities haven't been exploited yet, Jakobsson said.

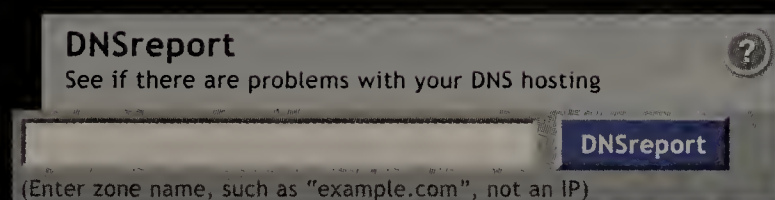
Although some argue users can't be taught to avoid online attacks, Jakobsson thinks his research can lead to better education methods. Some common advice is so vague that it's pretty much useless, he said, leaving lots of room for improvement.

"The technical component is important, but it's not all," Jakobsson said. ■

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WHAT YOU DO KNOW CAN HURT YOU.

.....

A screenshot of the DNSreport website interface. At the top, it says "DNSreport" with a subtitle "See if there are problems with your DNS hosting" and a help icon. Below this is a text input field with a "DNSreport" button to its right. A note below the input field says "(Enter zone name, such as 'example.com', not an IP)".

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See if there are problems with your DNS hosting

DNSreport

(Enter zone name, such as "example.com", not an IP)

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FCC ignores the lesson of Wi-Fi's history



NET INSIDER
Scott Bradner

As just about everybody predicted, the U.S. Federal Communications Commission recently decided that only giant telephone companies are smart enough to manage wireless spectrum. The FCC included a minuscule favor that it claimed might help the rest of us, but whether it actually will is far from clear.

In making its decision, the FCC ignored the basic lesson that it should have learned from Wi-Fi and rejected the most important part of a forward-looking proposal from Google.

In 2005, Congress passed the Digital Television Transition and Public Safety Act, which mandated that all analog TV broadcasting be discontinued on Feb. 17, 2009, and that the freed-up spectrum be split among public safety and other communications uses. The act requires that the FCC run an auction of the commercial part of the spectrum by Jan. 28, 2008. On July 31 the FCC announced a revised set of rules for that auction.

The FCC has decided on a public-private partnership to run the public safety part of the spectrum. The other option was a government-run, national public safety network. I'm not sure the path the FCC wants to take will change the overall result. Considering the unblemished history of such projects, I fully expect any useful network will be decades off — if it ever shows up — and will produce vast windfalls for a few selected vendors at the taxpayer's expense.

The FCC's decision about the public safety network was quite predictable and, sadly, so were its decisions about the rest of the spectrum.

Anyone who has been paying attention at all knows that the most dynamic explosion in the uses of wireless has come in the unlicensed, small chunks of spectrum where such technologies as Wi-Fi prosper. It would seem obvious that if the FCC's goal in deciding what to do with the to-be-released spectrum was — as the FCC press release states — “serving the public interest and the American people,” at least part of the spectrum would have been added to these unlicensed bands. Communications companies, however, do not spend billions of dollars (the FCC's minimum bid for a part of the spectrum is \$4.6 billion) to open up spectrum for everyone to use, for free. FCC Chairman Kevin Martin noted in his statement accompanying the news release that the FCC had to produce “a fair return on this asset for the American people.” In focusing on the auction return, the FCC ignores the proven value — far more than \$4.6B — that more unlicensed spectrum would have returned to the U.S. economy.

Google suggested a middle ground to the FCC, arguing that a chunk of the spectrum should be sold to companies that would provide open-access, wholesale service to customers. Google also recommended that the same chunk of spectrum support open applications, devices and services.

The FCC decided to support — mostly — the requirement for the winning bidder to support open devices, applications and services, but it did not agree to the most important of Google's suggestions: that providing wholesale services be required. The FCC also said that if it could not find a buyer at its minimum price, it would drop its requirements and rerun the auction.

Google has not said that it will not pony up the money and provide wholesale services. It might, but there is little chance that the other major bidders — mostly telephone companies, considering the FCC rules — will do so. If the telephone companies win, innovation in the wireless world will run at the speed of cell-phone data (very slow, very expensive or both) rather than 802.11 (ever faster and cheaper).

Disclaimer: Harvard, at 371 years old, is unlikely to be faster, more flexible or cheaper, and it has expressed no formal opinion on the FCC's ability not to learn from history.

Bradner is Harvard University's technology security officer. He can be reached at sob@sobco.com.

Q&A

Cisco co-founder Bosack's Next Big Thing



*Twenty-three years ago, the husband and wife team of Stanford University computer support staffers **Len Bosack** and **Sandy Lerner** founded the most powerful and valuable company in networking: Cisco Systems. Now CEO of XKL, Bosack last week rolled out what he believes is another breakthrough product for enterprise networks. He shares some thoughts with Network World Managing Editor Jim Duffy.*

XKL was founded in 1991 to do computer I/O and backplane research. What made you shift gears to optical?

We actually constructed a complete computer system that was a much smaller form factor replacement for a then-obsolete product made by Digital Equipment, which was one of their mainframe systems. So essentially we produced a half-rack unit system that replaced something that was the better part of 20 feet long. We sold a few of those to some of the then-remaining customers.

By 2003, it appeared as though the industry was ready to deliver on some of those promises [made during the bubble years of 1999-2002] in a way that we could see how to build a dense economical system that could be used by network builders as opposed to just telephone companies. So we took a lot of the work that we had been doing and tried to produce a really dense, potentially economical system. We were making a wager that the optical component makers could both deliver upon their promises and that they could actually do something that they were never very good at — make the price go down. And here we are almost four and a half years later.

So you see a lot of press releases from people saying the bright, bright future is here and it's all wonderful and it's easy to do and "Gee, why aren't we going from 40Gbps to 100Gbps because 40G is so yesterday?" That's just not the truth.

So your new DXM product is intended to bring optics to enterprise network builders with the familiarity of a Cisco router?

The people that we are probably going to sell most of these devices to have multiple campuses that already are buying multiple DS-3s. There are three prongs to the thinking about this product. One of them is an

economic fact: A lot of fiber went into the ground during the bubble and [the people deploying it] didn't really have a coherent vision as to what they were going to do with it. The financial results of that is that the current owners of these bits of glass in the ground can charge a pretty reasonable lease fee and feel that they're getting an excellent return on their invested capital.

Another prong is, computers keep getting faster. And what we see is that at these speeds there's no way in the world that humans are going to be a source of that. It's computers that do it. So then comes the observation: Well, where are the computers? Corporations own computers and they have a need to have them talk, manage them, back them up. ... When there's enough bandwidth around it changes how you can conduct your business.

So get all that hooked together and do it in a way that you're not paying for 45Mbps at a time every month. It turns out, because of the finances of these things, if you go to the trouble of running usually just across the parking lot to get to the fiber, you can get a phenomenal improvement in the cost per bit per second. It's not uncommon to see the cost per bit per second go down by a factor of 100, or even 500, or a factor of 1,000.

What price per bit, per second are you quoting to your potential customers?

I don't think we actually usually quote a particular price but here's how it typically goes: A DS-3 is usually a couple thousand dollars a month, depending on where you are and where it's going. For a fiber ring around a metro area, if you're only stopping in three or four places you get a monthly recurring charge in the \$20,000-per-month range. And there's a one-time cost to get to the fiber rings, and it's usually \$20,000 per location. That's when you actu-

ally have to dig a ditch to get there. There's the cost of the equipment, which in our case, for a 100Gbps pizza box, is one-eighth of \$1 million, basically. Four of those are \$500,000 in equipment. You got yourself 200Gbps of bandwidth out of that. ... That gives you 10 cents per megabit per second.

You see how the numbers come out. Even if it were 10 times more expensive, it's such a change that it's almost astounding that people shouldn't be running to do this, because it changes what they do in their business. They stop arguing about a scarcity.

Do you think the DXM has the potential to impact the market or the industry as your first Cisco router did?

If anybody had claimed in 1984 that you could purchase a graphically displayed GPS system powered by batteries for \$99 or less, no one should have believed you. At the time you were spending \$250,000 for two 7-foot racks, and at best it read out the numbers on a display.

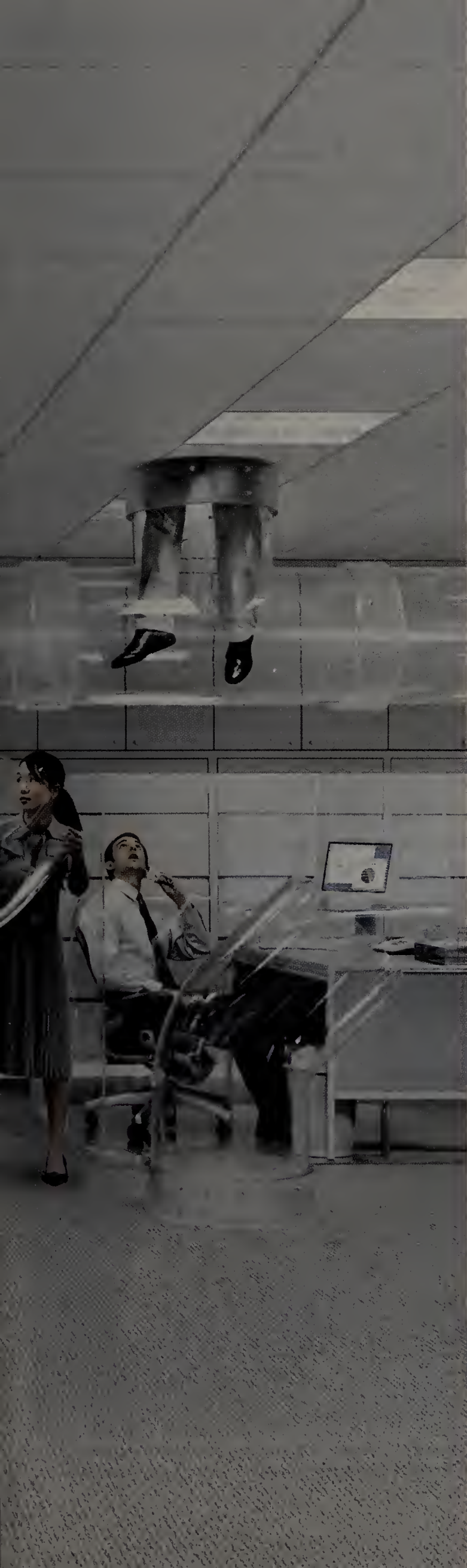
I can't quite make predictions like that it's going to change the whole world; it's all going to be different. The best I know I can tell you is, when you're getting bandwidth at 10 cents per megabit per second it's really different than what you see now.

What's your impression of the industry now since founding Cisco, and of Cisco's influence in it?

Cisco's doing fine. As they've grown, they have a very different business problem today than the ones that I'm interested in. They need to be all things to all people, ranging from friendly little things that people who ought not to know much about networking can install in their homes, to the CRS-1. It's good to see the benefits of broad, efficient data communications being made available around the world. I just wish it had gone faster. There's still access problems (that are) primarily political, not technical. I wish that weren't true. I wish there was more uniform, easy access the world round. But the business largely has developed very well. I'm a little surprised at the rate at which the money's grown in terms of the size of the business. I had certainly expected by the late 1980s that it was going to be possible to produce \$100 routers. But I'm not sure I would have guessed that there would have been \$39.95 routers. ■

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_INFRASTRUCTURE LOG

_DAY 68: The business climate is constantly changing. Our IT environment is completely rigid. We can't align IT to meet the larger business needs. I told Gil we need an SOA so we can be proactive for once.

_Gil had an idea. He brought in contractors and made the entire office "modular" and "flexible." Gil, I am not a hamster.

_DAY 70: This should free us up: IBM SOA Solutions built with IBM WebSphere®, the leading integration platform. Now we have the hardware, software and services for a flexible IT infrastructure. IBM has helped 3,600 companies implement an SOA. And getting started was easy. Our business is built for change.

_I don't have to crawl with my coffee anymore. It's great.

IBM.COM/**TAKEBACKCONTROL**/FLEXIBLE

SQUEEZING OUT EVERY PRECIOUS BIT

In this special package of Your Take interviews on IT optimization, learn how:

- **Lucasfilm** implements clustered computing, dark fiber with MPLS, VoIP and TCP flow optimization to punch up performance.
- **CME Group** keeps latency down to a few milliseconds on its global trading network.
- **Aurora Healthcare** is centralizing resources and implementing WAN acceleration to streamline its network of 180-plus sites.

IT optimization the Lucasfilm way

How the company that created "Star Wars" and "Indiana Jones" wrings the most out of its 10G Ethernet network and 4,000-plus servers

BY PAUL DESMOND

Lucasfilm is the creative force behind a host of special-effects-laden motion pictures, including the "Star Wars," "Indiana Jones" and "Pirates of the Caribbean" series. The firm has six divisions in addition to the parent company: Industrial Light and Magic, the special effects group; Lucas Arts and Entertainment, the gaming division; Lucasfilm Animation; Skywalker Sound; Lucas Licensing; and Lucas Online. The company operates from three locations in the San Francisco area and runs the Lucasfilm Animation facility in Singapore.

As you might expect, the demands on the IT group that serves the company's 1,200 employees are significant, given the computing horsepower it takes to enable the likes of Johnny Depp to ward off sea creatures with creepy, octopus-like heads.

Kevin Clark, director of IT operations for Lucasfilm, and Peter Hricak, senior manager for network and telecommunications, explain how, even with a server farm of more than 4,000 machines and a WAN with 10Gbps links, optimization is a must.

Can you describe your network setup?

Peter Hricak: For our campus networks we have three network cores, each based on a pair of 10G Ethernet chassis-based routers with a total of 128 10G ports. All desktops are usually linked at 1G to edge switches, which we connect to building distribution cores with two 10G interconnects. The building distribution cores then aggregate to the network core with four 10G interconnects each. Storage is directly 10G connected; we try to get as fast a path to the storage as we can.

On the WAN, we have two OC-3's connecting our campuses in the Bay Area and another to Singapore. We also have 10G dark fiber between two of our Bay Area campuses, as well as a 10G dark fiber line to a telco hotel in

downtown San Francisco.

What kinds of traffic are going back and

forth, especially over the wide area?

PH: The essence of the traffic is the work in progress that's being transferred and worked on by artists on a day-to-day basis. This is generally large image files, movies. We do frame-accurate motion jpeg on our transmission, so they're not very compressed. They are rendered at night by a render farm for ILM, then reviewed the next day, and more changes are made and the cycle starts again.

What does the render farm consist of?

Kevin Clark: We've got approximately 4,300 processors available within the data center. We use a distributed rendering model, so we've got a core within our data center of varying generations of systems, but primarily



Kevin Clark (left) and Peter Hricak are in constant optimization mode to help Lucasfilm deliver blockbusters like "Star Wars."

dual-core, dual [AMD] Opteron blades with up to 16M of memory on board. We also use available workstations that are out on the floor [such as after artists log off for the night]. Those are typically single-core or dual-core, dual Opteron HP workstations. So the render farm in total comprises about 5,500 processors.

How does the rendering process work?

PH: We take models and textures and through mathematical equations — sometimes through off-the-shelf software, sometimes through our own — we render the final images. On the more difficult effects like water, what goes in is textures and some general physics equations, and what comes out is a two-minute sequence of a boat being [swamped] by a wave.

How do you go about optimizing an environment like that?

KC: It's kind of a brute force approach in that you utilize all resources that are available. We're looking at making that process more efficient by utilizing multicore processors. Also, from a power-efficiency perspective, our render nodes are diskless blade servers, 66 of them per cabinet. The cabinet plugs in straight to 480V AC power. We convert that to 480V DC, then distribute 48V DC to each node in the cabinet. So we're bypassing our PDUs [power distribution units]. There's less energy loss in stepping down directly from 480 to the nodes vs. if we step it down to the PDUs at 240V and then distribute out from there.

In terms of optimizing our storage, we do deal with a lot of storage online. It's up to about 300TB online now, maybe just under. A lot of that is active data. Once a shot is completed and final, we'll archive that and remove it from the storage cluster. One of the problems that we run into, these shows grow in terms of complexity, and require more and more render and storage utilization. For example, when we did ["Star Wars"] Episode 3, back in 2005, that took up about 29TB on our storage cluster. "Pirates" 2 went up to 60 and "Pirates" 3 went up over 100. So we're really trying to work on how we can be more efficient in terms of workflow and our pipeline utilization so we can get that data offline quicker vs. just adding disk.

PH: Another optimization effort is the appropriate retirement of old equipment. We quickly realized that you end up spending more in service, support and power for what after three or four years becomes a pretty small computer that can be replaced with new hardware that's more efficient. We can replace four racks' worth of equipment with one rack of new gear. That clearly shows a savings on the power front year after year.

Do you have a figure for when your equipment is fully amortized?

KC: We typically work on a three-year cycle for depreciation. But we have a refresh cycle

Getting personal:		Kevin Clark	Peter Hricak
Title:		Director of IT operations	Senior manager for network and telecommunications
Organization:		Lucasfilm Ltd.	
Annual budget:		\$20 million to \$25 million	
IT staff:		57	
Previous jobs:		Managed data-center operations group for Autodesk, where he worked for 10 years	Managing the IT department at 3DO, a video-game console and game developer
First PC:		IBM 286 clone	Tandy TRS-80
First experience on the Internet:		Using message boards: "Just having that extended contact with people to share common interests was very cool."	Bridging from Bitnet to TCP/IP, to connect a university to a hospital network. "If that doesn't count, I had my first Internet feed at 3DO, a 56Kbps line in 1992."
Home network:		Four-PC wireless network, not including TiVo. "Nothing extravagant, but it is secure."	Gigabit network with 14 devices, with DSL to the Internet and a [Code Division Multiple Access] backup. "My girlfriend is also very computer-intensive, so most of my network is for her. She's the one who demands the uptime and reliability."

that is much faster than three years. We'll refresh systems for a specific artist or discipline every 12 months, sometimes less. We might be able allocate those two older workstations out for a different discipline that's not going to need the same amount of memory or the same processing requirements, or we can reuse that for some type of administrative task.

What kinds of things have you done to optimize your wide-area links?

PH: We have a dark fiber line to a telco hotel. We run a 10G link with virtual LANs and MPLS, so we're able to bring in a variety of services on the same link. We can have telephony, private data to another studio, and public Internet services all running on the same high-capacity pipe. Without having to build a last mile for each of these carriers, it's much easier to bring in services rapidly and cost effectively.

What about on the campus — any network optimization efforts there?

PH: We're a 100% VoIP shop at this point. One of the advantages that's brought us is that by bringing Power over Ethernet down to the port, we've managed basically to implement standards-based power to every desk, for everything from access points to telephone sets.

How are you dealing with power and cooling issues in your data centers?

KC: We're pretty aggressively pursuing virtualization options to reduce the number of

physical servers. I'm sure everyone else suffers from the same thing where you've got maybe 10 different types of servers, whether they're FileMaker or some other type of application, but they're highly underutilized. We're working on consolidating those where we can. We're also pretty aggressively looking to retire some older render systems that we know aren't nearly as power-efficient. We're going to pull those out and replace about 17 racks of [AMD] Athlon-based render processors that are 4 or 5 years old with a single rack of the newest-generation dual-core, and soon to be quad-core, dual Opteron blade render systems. So we can save both on power efficiency, as well as the heating/cooling perspective.

What kinds of things do you do to optimize the performance of your various Web sites?

PH: What we've done isn't as much as we're planning on doing. We are upgrading the hardware, getting them on a platform with many fewer servers than they currently have. We're also looking at TCP-flow optimization as well as some caching. Flow optimization really helps the server count. What I was doing with 10 servers, I can now do with four. That's just through straight TCP optimization of the protocol, keeping connections open instead of closing them down all the time.

Desmond is events editor for Network World and president of PDEdit, an IT publishing company in Southborough, Mass. Reach him at paul@pdedit.com.

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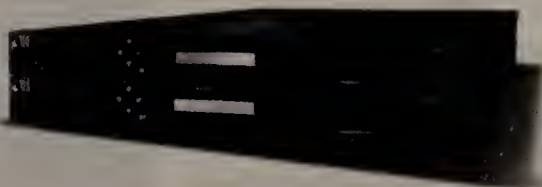
_INFRASTRUCTURE LOG

_DAY 53: We're flooded with information. Data. E-mails. Web content. Video. It's trapped in unconnected systems. It's practically inaccessible. We need to do something.

_Gil needs help finding the right info, but I specifically listed "fear of heights" as a weakness during my last review.

_DAY 54: The answer: IBM solutions for leveraging information. They can help us build a high-performance infrastructure to bring info together, up and down the stack. IBM middleware consolidates critical structured and unstructured info across the silos for a single, unified view. IBM servers and storage give us virtualization for improved utilization.

_Now we can make better decisions with our info. I feel so much more grounded now.



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On CME Globex, milliseconds matter

Optimizing its global trading network helps CME Group conduct trades faster and keep up with ever-increasing demand

BY PAUL DESMOND

CME Group is the world's largest exchange, with trading volume averaging more than 11 million contracts per day in July 2007. Formed by the recent merger of Chicago Mercantile Exchange Holdings with CBOT Holdings, the company offers a marketplace to trade products that range from agricultural goods to real estate investments.

Nearly 80% of all trading occurs on the CME Globex electronic trading network. Joe Panfil, director of enterprise technology services for CME Group, explains how optimizing his IT environment helps him keep up with the dramatic increase in demand.

Electronic trading at CME has seen a compound annual growth rate of 300% since 2000. How do you keep up with that kind of growth?

The way we've dealt with it is we've been on the leading edge of WAN connectivity. Where we used to use a 56K line, we're offering our customers 20M and 40M circuits.

Who are your customers?

Big banks, big FCMs [futures commission merchants], UBS, JP Morgan, Morgan Stanley, those types.

Can you walk through the network setup? I understand you've got three major data centers in the Chicago area, another in London, plus six hub sites throughout Europe and another hub in Singapore.

Right. Our remote facilities are all connected by multiple diversely routed [dense wavelength division multiplexing] rings. Each ring is equipped with multiple load-balanced 10G Ethernet links. The rings are configured to provide maximum resiliency with minimal transport latency. We're in the microseconds when we talk about going between data centers.

How many servers do you have?

We're at about 3,600 servers. We count one system as a server, but one system could have 16 CPUs. Of the 3,600, about 3,200 are Unix and Linux, with Linux being 80%. And the rest are Windows and Novell servers. And we have approximately 18 Tandems.

Last year, Network World wrote that trades execute in 50 to 60 milliseconds on aver-

age, down from about 140 millisec in January 2004. What kind of work have you done in optimizing performance to get those kinds of numbers?

We have new numbers now. On our options platform, we're using a different type of engine. It's in the range of 3 to 5 milliseconds for matching, so it's a lot faster. On futures, we're on the same platform we were on, but now we're in the 20- to 35-millisecond range. So on each platform, we increased our speeds and dropped our latencies.

With the futures engine, it's been centered mostly around optimizing the code. We always go to new hardware when a manufacturer has newer, faster hardware. But beyond that, it's how quick we can make the code that does the [trade] matching.

Do you do anything to the machines themselves to try to optimize them?

Outside of code optimization, we do everything possible for operating system optimization and then all the peripherals. For critical parts of data that we write to often, we're in the process of moving those blocks of data to solid state storage arrays. [Editor's note: Solid-state storage is based on integrated circuits, requires no moving parts and is typically faster than tape or optical storage mediums.] We already do it on the options-based engine, and we're starting to do it on the futures-based



For Joe Panfil, optimization comes down to simple mathematics: If he can help make trades happen faster, CME Group can process more trades.

engine. The futures-based engine is based on a Tandem platform. We were one of the first customers in the world to start using SAN storage on that platform. So between SAN and the solid-state arrays, all the talking between any storage is greatly increased in speed.

What other steps are involved in optimizing, such as with the OS?

It's a matter of distributing resources as you need them. There's kernel-tuning parameters that are adjusted, plus things in the TCP/IP layer. It's tweaks here and there. We do a lot of [processing] in memory. I don't think it's a secret that you do stuff in memory; it's quicker than doing it out to disk, even if it is SAN and solid-state storage.

Optimization also extends to reliability and CME's trading systems are rated at five 9s reliability. What are some of the key steps you've taken to achieve that?

The key step is we have a team that reviews single points of failure, and we eliminate them. When you start with Tandem, the hardware itself is redundant. In the Linux world, we'll have multiple servers that are clustered, so you have redundancy there. And then it just works its way back. If I have a switch, and I'm talking between the order engine environment and the match engine via one path, the backup path for that engine and for that order entry environment is going to be on a totally separate network switch. So we could in essence lose a whole network switch, and we should have failover within seconds to the backup path. That's what we do across the board. For every server, let's say a gateway server, there's a backup hot gateway server. And we're using a publish/subscribe protocol, so if we have a failure of a primary server, the secondary server automatically starts reading that data and passing it on.

What kinds of power and cooling issues are you facing in your data centers?

We built our two main data centers with power and cooling redundancy in mind, but also a high power rating per square foot. We're leveraging new Liebert XDO [rack-cooling] technology that does cooling from above, with a liquid vs. an outside cooling source. We have, like, the first 10 serial numbers that they started to make. We stay on top of all this stuff.

As far as saving money, we have one data center equipped to process outside air. We're able to shut off the air conditioners for most of the winter because we just take the outside air that's already cool and process it, to control things like dust and humidity, and use it within the data center.

To what extent are you using virtualization

Getting personal: Joe Panfil

Title:	Managing director of enterprise technology services
Organization:	CME Group
Responsibilities:	Computer operations, distributed computing environment, storage, monitoring group, information security and data center staff.
Annual budget:	Undisclosed, other than to say CME Group spends 90% of its capital budget each year on IT.
IT staff:	About 600 total, 120 in his group
Previous jobs:	IT positions at Tradelink, a trading firm, for seven years; First Option of Chicago for one year; and Rich, a trading system company, for three years.
First PC:	Atari 520ST
Home network:	Four computers wired to a switch, which is connected to a router linked to the Internet. "We built the house four years ago and had all the rooms wired with CAT-5."
Words to live by:	Always do what's right for the customer.

to help optimize your environment?

We're doing that more in our development environments. We have real critical requirements for our production systems. In essence, I could have a production system running at 5% CPU use, and the [government releases] the unemployment number and there's a big change and [use] jumps to 75%. Let's say I was running four virtual servers on that box and they all had that jump. The CPU would get flooded and run out of cycles to give out and the user would experience latency. That's unacceptable in our world. But in our development and QA environments, it's acceptable to do virtualization.

What kind of benefit has that given you?

We are in the middle of doing it. We estimate we're going to knock down our development and [quality-assurance] environments by about 50%. It's about 400 servers now.

Whose virtualization software are you using?

We're using two pieces right now: Xen from Redhat Linux and Sun Solaris Containers.

What other steps have you taken to optimize your IT environment?

A big push that we've made over the last couple of years is to really get off of proprietary hardware and get on to x86, Intel and AMD-based. We try to not focus on a single vendor. It could be HP, Dell or IBM. We don't really discriminate. It's what vendor can meet our specs and is giving us a good price.

Lots of people like to go with the same vendor to ease management, procurement

and the like. How do you deal with some of those issues given that you prefer to use multiple vendors?

We have a spec that we wrote and have basically given the spec to all the vendors. We're looking for them to design to that spec, which is along the lines of a Linux-centric server. A lot of vendors were taking the boxes that they were building for Windows and saying, 'OK, you can start using it for Linux.' And it was missing things like management, even things like hardware alerts. We work really closely with the manufacturers and push them to get what we want.

How quickly do you amortize a typical system?

I think we were on a three-year cycle. But with our electronic trading environment it's probably closer to 18 months, because when new hardware comes along, we can get benefit out of that. What we've found historically is that when we make the electronic trading environment faster, more trades happen. We're not saying more trades happen because we're faster; we're just enabling it to happen. If each trade took a second, and you had one user putting in trades, they could get 60 in a minute. If you cut that down to a half-second, they could get 120 trades in. If your user base stays the same and your time stays the same, then you're going to reach some limit as to how many trades you can have. Because we keep trimming the time back, we keep coming to a new record quarterly.

Desmond is events editor for Network World and president of PDEdit, an IT publishing company in Southborough, Mass. Reach him at paul@pdedit.com.

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_INFRASTRUCTURE LOG

_DAY 56: Our voice and data networks are out of control. Nothing's unified. Nothing's integrated. We have to use different devices for different things. Gil's had enough.

_He's welding every device in the office together with a blowtorch. He calls it "The Unifier."

_DAY 57: I found a better way: Unified Communications and Collaboration solutions from IBM. Now we can integrate our networks to give us real-time access on virtually any device. With the IBM Lotus® Sametime® 7.5 platform we get way more than IM. It combines IP Telephony, Web conferencing and more into a single interface. We're working fast and for less.

_Does this mean our office is no longer a hard-hat zone?

Lotus.

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Aurora preps for a wholesale change in network strategy

Large Wisconsin healthcare provider explores a centralized server strategy and WAN acceleration to optimize its network of 180-plus sites

BY PAUL DESMOND

Aurora Health Care employs more than 25,000 people, making it the second-largest private employer in Wisconsin. Aurora IT serves more than 180 facilities in the eastern part of the state, mostly health clinics of varying sizes, but also 13 hospitals, including Aurora St. Luke's Medical Center in Milwaukee, the state's largest private hospital.

Charged with keeping Aurora's network and applications healthy is an IT group that numbers about 600, including Greg Ragsdale, a senior enterprise network engineer. Ragsdale explained some of the steps Aurora is taking to optimize the network and get the most out of the staff of 15 that maintains it.

Can you describe your network setup?

We are set up in a hub and spoke environment. We have five regional hubs that split the state up geographically. Four of them are hospitals, the other is our data center, which serves as the regional hub in the metro Milwaukee area. Each of our clinics and hospitals connect to one of the hubs and we tie in pharmacies using a frame relay MPLS network. Everything ultimately comes back to our core data center in Milwaukee.

We do everything Ethernet on the LAN side, everything from 100M bit to Gigabit, with a little bit of 10G. In our WAN, we have a few DSL-connected sites — about a dozen and half of those, which we connect to the data center using secure VPN tunnels over the Internet. The majority of our clinics use T-1 or multiples thereof; we have some that have two or three T-1s aggregated together. All of our regional hubs are fed by DS3s. We have four hospitals in the Milwaukee area that are connected via metropolitan Gigabit Ethernet. Our largest facility, St. Luke's Medical Center, which is less than a half mile away from our corporate office, is fed by 10 Gigabit.

What kinds of traffic are going back and forth?

The bulk of it is electronic charting, from our medical records application. There's also scheduling and billing information as well as administrative apps like e-mail, Internet access, and file and print services. The other big one is medical imaging — MRI scans, CT

scans, things like that. We don't have that everywhere, but it's being pushed out to clinics more and more. We're seeing even smaller clinics getting 64-slice [high-resolution] CT scanners — very sophisticated equipment that creates very large images. We archive the images in our core data center and need to provide access to the local radiologists and doctors in the clinics. The images have to be diagnostic quality. And we also have radiologists on call. So if a patient comes into the hospital in the middle of the night and has to have an image taken, the radiologist needs to be available to read that right away, so they're typically connected at home via DSL or cable modem. That's also a

challenge for us, getting those images out to them quickly for diagnosis.

What do you do to optimize your network links?

We have implemented a standard quality-of-service policy for all our remote sites. Today it's simply class-based queuing. We're using a percentage-of-bandwidth approach to guarantee delivery to some applications, such as the electronic medical records, and restrict bandwidth to others, such as backups, which we limit during normal operating hours.

We are evaluating consolidating our servers to a centralized site. So we would remove local file and print servers from each remote site [and operate them in the data center instead]. In order to do that, we have to make sure the WAN can handle the traffic. So WAN optimization is playing a heavy role in that.

What's the idea behind centralizing all of your file and print servers?

Getting all those servers bundled together with a centralized group taking care of them will create efficiencies. It provides a single



Greg Ragsdale is looking at a centralized server strategy and WAN optimization tools to help keep Aurora Health Care's network humming.

point of administration, removes some complexity and reduces the turnaround time for adding new users, modifies, deletes, things like that.

It's going to be a lot easier from a server administrator standpoint if we're able to eliminate file and print servers at more sites and just have WAN accelerators in place. They require a lot less maintenance and upkeep to worry about than with file servers. Not just maintenance of the server itself, but making sure the operating system is patched right, backups are done, everything like that.

What are some of the WAN-acceleration technologies you're exploring?

We've looked at several different products. The vendors we're looking at all seem to do it pretty similarly. One of the two common ways to do it is to plug the accelerator in-line with your router in your local-area network. The other is to run it out-of-band, using the WCCP protocol, or Web Cache Communication Protocol. That was a proprietary Cisco protocol but it has become a de facto standard. Some vendors say we'll do both but we prefer one over the other. But they all pretty much come down to caching files and data patterns on the remote side. They analyze bit patterns to find patterns that repeat [and can be taken out and cached.] I look at it as kind of the ultimate in recycling.

Have you tested any of the WAN accelerators?

We have one product in at one location. We did it as a pilot for a Sybase database application for the visiting nurse arm of our services. These nurses carry laptops with them and they go out and visit people at home. They have to download a copy of the database. The database has grown to 6GB or 7GB, so they were having a hard time getting that done in a timely manner. Initially the WAN acceleration product worked very well — we saw upwards of 85% of all the data being cached locally, which greatly improved their performance. But [for Health Insurance Portability and Accountability Act compliance] that database has now moved to encrypted technology that's proprietary to the database — it's not SSL or one of the open standards. So now the percentage of data being cached locally is only in the teens.

Is there any solution for that?

We don't have a solution in place at this time. Part of it is the nature of the application. Sybase is doing their own encryption and they won't divulge details of what they do. So there isn't any product out there today that can help with that. [The WAN acceleration vendor is] looking at doing some upgrades, but nothing in the immediate future.

A couple of the vendors we're looking at do offer acceleration for encrypted traffic, but it's all SSL-based. That's going to be key because

Getting personal: Greg Ragsdale

Title:	Senior enterprise network engineer
Responsibilities:	One of several on the team responsible for routing, switching, wireless, WAN circuits, design and maintenance of the network, troubleshooting, DNS and DHCP services and security services.
Previous jobs:	Network engineer at CVS pharmacy
Education	B.S. in Business Management, Milwaukee School of Engineering.
First PC:	Commodore 64
Home network:	Wireless LAN with a Mac and two laptops
First experience with the Internet:	First IT job was working the help desk at college in the mid-1990s, using the Mosaic browser.

our applications are moving more to the encrypted world. But with this Microsoft project the bottom line comes down to this: We either put WAN accelerators at each site or we put local file and print servers at each site. The cost differential for 100-plus sites can be pretty big.

Do you have a ballpark figure on what that cost differential is?

You have to talk total cost of ownership. We can put a single appliance at the site for WAN optimization or acceleration and it's managed centrally by our group. Or you have a local file server which has to be maintained and backed up, so you have to account for storage space on a [storage-area network] or tapes or whatever. Plus there's the maintenance and upkeep of the server itself. Putting hard numbers against it, list price on most of the remote side WAN accelerators is between \$7,000 and \$10,000. You can probably put a low-end server out for around \$5,000. But then accounting for disk space on a SAN, bandwidth used for backups and things like that, it comes out to much more.

What kinds of things do you do to ensure your switches and routers are optimized and running at peak performance?

We're a very heavy user of [CA] Spectrum. Everything we control and have responsibility for is monitored by Spectrum — switches, routers, wireless access points, any sort of appliances that we have. We don't just use it for up/down alarming. On our WAN circuits, we watch bandwidth utilization. We have thresholds such that if bandwidth rises above a certain percentage, Spectrum will send e-mails to alert us. Then we can track and trend those over time and explore whether we need to add bandwidth.

Also within our network team we've formed a couple of subgroups, including a standardization group. We meet monthly and go over everything from firmware versions on routers and switches, access points and such to standardized configurations, standardized naming conventions, that kind of thing. We make

recommendations for improvements. We also have an outage review group that meets weekly to track all of our outages. If a circuit drops, if a router or switch dies, we track all of that and look at the previous week's outages to determine what happened. Then we look back over the last few weeks to identify trends. Maybe that leads us to find a bug in the firmware. We do periodic checks of the latest firmware releases from all of our vendors. We don't necessarily want to always be on the latest and greatest, but we always want to look and see if there are known bugs that have come up, security vulnerabilities or if there's a new feature we need or would like to take advantage of. We try and fold that into the standards group, so once a month we're taking a look at firmware releases from all our vendors.

What other optimization efforts have you undertaken?

Recently we've made some changes to our change control process. As an IT group, a suggestion came out of an audit we had done a year ago, so we made some changes there. Everything we do is logged and tracked, and our management looks at [the change reports].

What kind of modifications did you make in your change management approach?

We have updated our existing change control process using ITIL [IT Infrastructure Library] best practices as a foundation, including the creation of a Change Advisory Board. We've made improvements in change categorization and process flow, added more consistency to our management review and approval processes, and we've improved our internal audit process to ensure compliance. We've also made updates to our change control tracking application to reflect these process changes and to provide a single tool used by all of IS.

Desmond is events editor for Network World and president of PDEdit, an IT publishing company in Southborough, Mass. Reach him at paul@pdedit.com.

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Application acceleration: Making Windows go *fast*

Tests show big bandwidth savings, faster transfer times

BY DAVID NEWMAN, NETWORK WORLD LAB ALLIANCE

Imagine walking into the CIO's office tomorrow and saying, "I can cut our WAN consumption by as much as 80 times, speed file transfers as much as 45 times and make our Windows users a whole lot happier." Think you'd get the CIO's attention?

Those aren't just idle claims. Seven months of rigorous testing showed us why application acceleration is such a hot area: These devices really work.

We tested boxes from Blue Coat Systems, Cisco, Riverbed Technology and Silver Peak Systems in a true enterprise context, with a massive test bed pushing data over multiple T-3 and T-1 links (see "How we did it," page 54). After pounding the systems with the most popular enterprise applications, we're inclined to believe the hype.

Even if average speedups are "only" around five to 10 times, that's still a big improvement. With 31% of IT budgets eaten up by recurring monthly WAN costs, according to a recent Nemertes Research study, application acceleration promises potentially huge cost savings.

Riverbed's Steelhead appliances outperformed the field in most tests, and won our Clear Choice award. But all these devices deserve serious consideration: Blue Coat's SG appliances for solid HTTP optimization; Cisco's Wide Area Application System (WAAS) for excellent compression, traffic transparency and interoperability with other devices; and Silver Peak's NX appliances for strong scalability and intuitive traffic reporting tools.

Why is Windows so bad?

The problem statement for application acceleration is simple: Windows performance in the WAN is lousy. To begin with, Windows' two

workhorse protocols — TCP and NetBIOS — were never intended for use in low-bandwidth or high-delay networks. Windows XP Service Pack 2 compounds these problems with some spectacularly suboptimal configuration defaults. (Windows Vista is better, but it isn't widely implemented yet.)

By default, XP's TCP stack advertises a receive window — the maximum amount of data allowed in flight without acknowledgment — of 64KB. That's fine as far as it goes, but XP isn't very responsive about resizing that window in response to loss or delay. A large, static receive window contributes to retransmissions, possible packet loss and poor response time.

To make matters worse, XP doesn't use a common TCP option called window scaling that can expand a 64KB receive window by a factor of four or more. Even when network conditions let XP go much faster, it won't. (There is a registry hack to enable window-scaling, but even then, it isn't used by the Windows file-handling protocol.)

WAN performance is always limited by the so-called bandwidth-delay product, but the constraints with Windows clients are especially severe. For example, if a link between Boston and Los Angeles has a 100-msec round-trip delay and the Windows TCP receive window is 64KB, the highest transmission rate possible is only around 5.6Mbps, regardless of link speed. Ordering up a T-3 or OC-3 connection won't help, at least not for any given Windows TCP connection; 5.6Mbps is as good as it gets.

WAN acceleration devices compensate for these shortcomings with a variety of tricks, including block caching, compression, connection multiplexing and application-layer optimization. While not all devices

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NETRESULTS

	Steelhead	Wide Area Application System (WAAS)	NX appliances	SG8100, SG200, Director
Product	Steelhead	Wide Area Application System (WAAS)	NX appliances	SG8100, SG200, Director
Vendor	Riverbed Technology www.riverbed.com	Cisco Systems www.cisco.com	Silver Peak Systems www.silver-peak.com	Blue Coat Systems www.bluecoat.com
Version tested	4.0.0a	4.0.12.b33	2.0.0.0_15619	5.1.4.21.29594
Price	Steelhead 5520, \$70,000; Steelhead 3520, \$45,000; Steelhead 1020, \$12,500; Central Management Console 8000, \$5,000. Total as tested, \$190,000.	WAE-7371, \$120,000; WAE-612, \$22,000; WAE-512, \$14,800; Central Manager, \$11,800. Total as tested, \$303,400.	NX-7500, \$65,000; NX-5500, \$45,000; NX-2500, \$10,000; GX-1000, \$10,000. Total as tested, \$185,000.	SG8100, \$51,200; SG200, \$5,500; Director, \$18,000. Total as tested, \$182,700.
Pros	Top performer; excellent reporting; easy-to-use interface.	Strong in CIFS performance, compression, concurrent connections; good reporting via new dashboard.	Long list of predefined application types; good reporting; easy-to-use interface.	Long list of optimized applications; strong SSL performer.
Cons	External marking required for QoS tests; SSL optimization not supported yet.	Sped up HTTP less than some other devices; SSL optimization not supported yet.	Performance in some tests didn't match vendor's results.	Some software issues in testing; central management not as unified as in others.
Score	4.65	4.43	4.31	3.85



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CLEAR CHOICE TEST APPLICATION ACCELERATION

App acceleration

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implement every method, all sharply reduce response time and bandwidth for Windows applications across the WAN.

Faster file service

As part of our research for this test, we asked vendors and several corporate IT shops to name their top five candidates for application acceleration, and every respondent named Common Internet File System (CIFS) as its top pick. This is understandable, given that Microsoft's notoriously chatty file-handling protocol originally was intended for LAN-only operations. Given its popularity and performance issues, we made CIFS the highlight of our performance testing.

We tested application acceleration the way enterprises use it — with multiple WAN links and round-trip times. Our test bed modeled a hub-and-spoke WAN linking with a headquarters office plus four remote sites, two apiece on T-1 and T-3 links. The remote sites represented every permutation of high and low bandwidth and delay.

At each of the remote sites, we configured XP clients to upload and download directories containing Word documents from a Windows Server 2003 machine at headquarters.

To measure the effects of block and/or file caching, we ran the CIFS tests three times. First was a "cold run" with all caches empty. Second was a "warm run" that repeated the same transfer as the cold run, this time with the files already in cache. Finally, we changed the contents of 10% of the files; this "10% run" forced devices to serve some but not all content from the origin server.

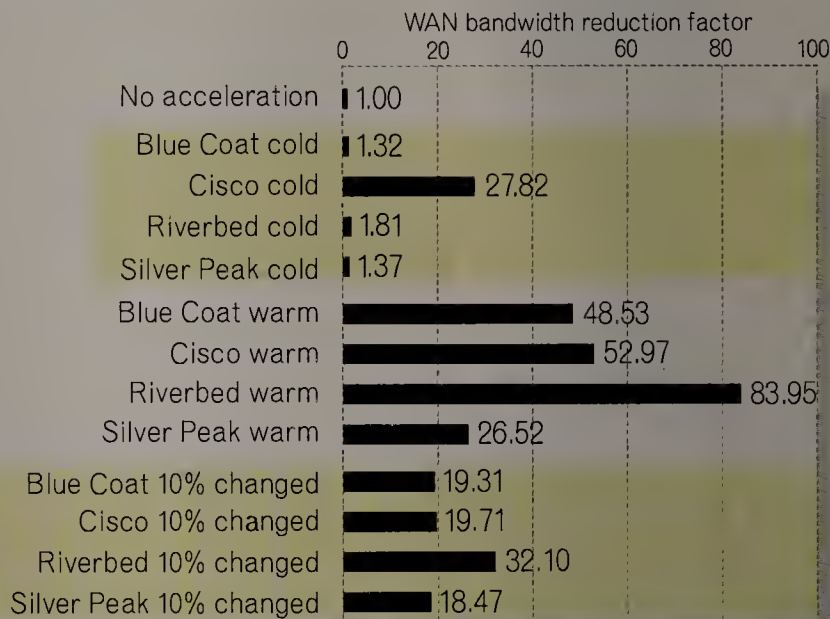
The two most important application-acceleration metrics are bandwidth reduction and response-time improvement. While we measured both in this test, our results show there's not necessarily a strong correlation between the two. A device with a powerful compression engine might do well at reducing bandwidth consumption, but the time spent putting the squeeze on data might increase response time or, at best, yield only modest improvements. Conversely, some devices might willingly trade off a bit more bandwidth consumption if the net result is faster overall data delivery.

Looking first at bandwidth-reduction results, all products substantially lightened the WAN load, but big differences exist across devices depending on cache contents (see Figure 1, "CIFS WAN bandwidth reduction," above right). For example, in the cold run (caches empty), Cisco's Wide Area Engine (WAE) appliances were by far the most effective at compression, using nearly 28 times less bandwidth than was used in our baseline, no-device test. In contrast, the bandwidth savings for other devices seeing data for the first time was usually less than a two-times reduction in bandwidth, according to measurements taken by a ClearSight Networks Network Analyzer.

Note that we're presenting all results in terms of relative improvement rather than absolute numbers. For example, in the CIFS cold run, Cisco's devices consumed 130MB of WAN bandwidth, compared with 3.6GB with no acceleration device inline, which translates into using 27.82 times less bandwidth. (The absolute numbers from all tests are available online; see www.nwdocfinder.com/9921.)

CIFS WAN bandwidth reduction [FIGURE 1]

Application-acceleration devices reduce WAN bandwidth consumption the most when they handle data they've previously seen. We tested each device three times: "cold run" with caches empty, a "warm run" with caches populated and a "10% run" with 10% of files changed. In the warm run, Riverbed's Steelhead used nearly 84 times less bandwidth than a baseline test with no device.



Given that enterprise data patterns are repetitive and subject to change, bandwidth reduction in the warm and 10% test cases can be more meaningful — and this is where these devices really shine.

Riverbed's Steelhead appliances topped these tests, reducing bandwidth by a factor of 84 in the warm run and a factor of 32 in the 10% run. While the other devices reduced bandwidth by a lesser degree, the improvements were still dramatic. Any device that reduces bandwidth use by 20 or 30 times must be considered a boon to IT budgets.

We also used the ClearSight analyzer to measure LAN bandwidth consumption (see graphic, "CIFS LAN bandwidth reduction" and other online-only performance results at www.nwdocfinder.com/9921). LAN differences among products were not as dramatic as WAN differences. The Blue Coat and Cisco devices reduced LAN bandwidth consumption by factors of 1.5 to 2 in our warm run and 10% run, because these vendors' headquarters devices served objects out of cache instead of from the origin servers. In contrast, the Riverbed and Silver Peak devices increased LAN use by 2% to 10%, probably because of appliance control traffic. Changes in bandwidth use don't always correlate with changes in response time, however.

Measuring CIFS response time

We used a common enterprise task to gauge CIFS response time, measuring how long it took for a client to upload or download a set of Word files to or from a server. We measured transfer times at each of our four remote sites — each representing a different permutation of high and low bandwidth and delay. We're presenting the results for each site because users' requirements differ depending on where they work. As our results suggest, some appliances do a better job at accelerating CIFS in low-bandwidth settings; others are better for high-delay settings.

Arguably, the most important results for enterprises are from the 10% runs, where we offered 10% new content and 90% existing content to each set of appliances. This represents an enterprise where many users might see the same docu-

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SCORECARD

Category	Weight	Riverbed	Cisco	Silver Peak	Blue Coat
Performance	45%	5	4.5	4.25	4.5
Functionality	20%	4.5	4.5	4.5	4.5
Manageability	20%	4.5	4.5	4.5	2.75
Usability	15%	4	4	4	2.5
Total score		4.65	4.43	4.31	3.85

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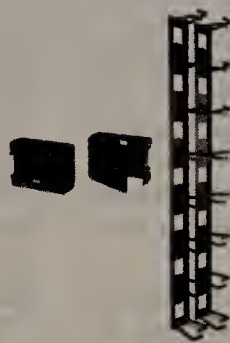
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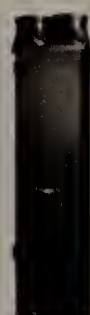
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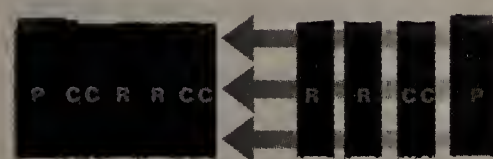
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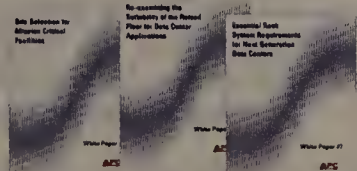
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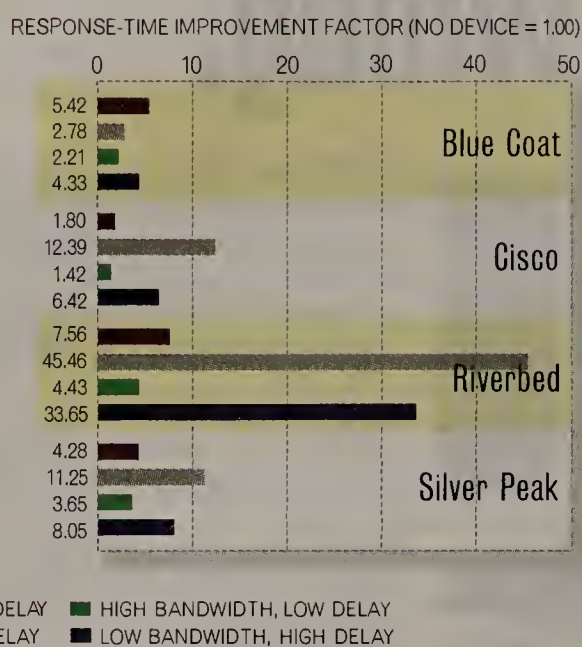
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Downloading CIFS [FIGURE 2]

File downloads go much faster with application acceleration. In situations where 10% of user data changed, downloads moved as much as 45 times faster with acceleration than without it. The biggest boosts generally came on lower-speed T-1 links, regardless of delay.



Note that response-time improvements do not track linearly with bandwidth-reduction results. For example, Cisco's devices were more efficient, relative to their competitors, at reducing WAN bandwidth consumption than at speeding CIFS transfer times.

In reviewing the CIFS results, Riverbed commented that it achieved even greater improvement over no-acceleration baselines by using many small files. Our tests used a mix of random file sizes of 25KB to 1MB. Both approaches have their merits: Riverbed's short-file methodology is more stressful on devices' CIFS processing engines (stress is a good thing in device benchmarking), while a mix of larger files may offer a more meaningful prediction of device performance in production settings.

Mail call

After CIFS, the next most popular candidate for acceleration is Messaging API (MAPI) traffic. MAPI is the e-mail protocol used by the Microsoft Exchange server and Outlook clients. All devices tested can speed up MAPI traffic, but in our tests the improvements were far less significant than in the CIFS tests.

In our MAPI tests, all clients sent messages — some with Word attachments, some without — to all other clients through an Exchange 2003 server. As with the CIFS tests, the number of messages was proportional to each site's link speed — fewer messages for clients at T-1 sites, more for those at T-3 sites.

There was significantly less differentiation among products when accelerating MAPI traffic, compared to CIFS traffic (see Figure 4, "MAPI acceleration," page 50). All products sped mail delivery, but only by factors of 1.24 to 2.39 compared with a no-device baseline. Averaging results across all sites, the Blue Coat devices provided the biggest boost for mail traffic, but by a relatively small margin over the Riverbed, Silver Peak and Cisco devices.

Doubling e-mail performance is nothing to sneeze at, but we also wanted to understand why MAPI performance didn't match CIFS performance. A few minutes with the ClearSight analyzer gave us the answer: The Outlook 2007 clients we used in this test encrypt e-mail traffic by default.

To the acceleration appliances, most of the MAPI data structures weren't visible to be optimized. Some acceleration was still possible, through TCP optimizations or because some MAPI traffic was visible. After reviewing the results, Riverbed said it encourages Outlook 2007 users to disable encryption for highest performance. That said, network managers using the new version of Outlook should consider whether the security/performance trade-off is worthwhile.

App acceleration

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ments repeatedly but where there also would be some new documents added to the mix.

In the download tests, low-bandwidth sites tended to see the biggest improvements in response time, regardless of the amount of delay present (see Figure 2, "Downloading CIFS," above). Riverbed's Steelhead appliances sped up file transfers 45 times to a low-bandwidth, low-delay site and 34 times to a low-bandwidth, high-delay site. The Steelhead appliances were also tops for the high-bandwidth sites, but to a lesser degree, with speed increases of four to seven times.

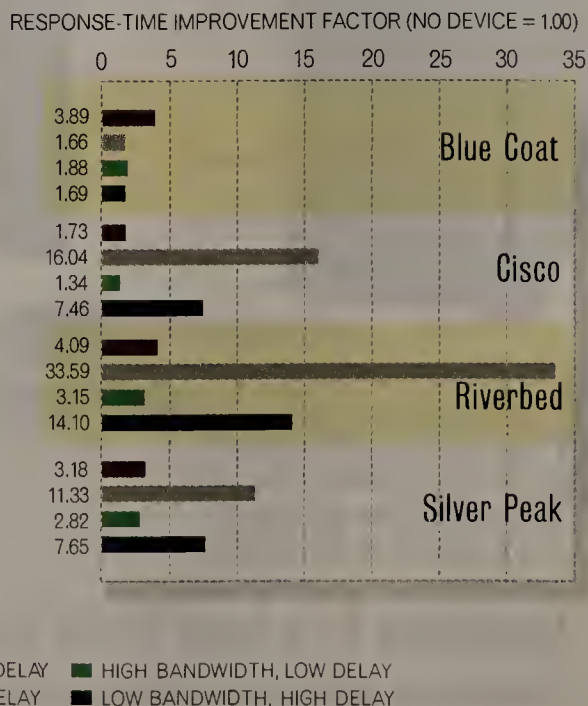
The Silver Peak NX appliances were next most efficient overall, with speedups of three to 16 times (again, with the most improvement shown for low-bandwidth sites), followed by the Cisco and Blue Coat appliances.

File uploads generally don't benefit from application acceleration as much as downloads do. When handling client downloads, acceleration devices either serve content from a client-side cache, pipeline data using read-ahead operations or employ some combination of the two approaches. That's not possible with write operations, because an acceleration device can't predict in advance what data the client will send.

Even so, big improvements in upload performance are still possible (see Figure 3, "Uploading CIFS," at right). Riverbed's Steelhead appliance again led the pack, with speedups of three to 34 times compared with no acceleration. Accelerations from the Silver Peak, Cisco and Blue Coat devices were less dramatic but still significant, moving traffic 1.3 to 16 times faster than our baseline test. Most devices sped up data the most from low-bandwidth sites. Blue Coat's SG was an exception; it delivered the greatest upload benefit to the high-bandwidth, high-delay site.

Uploading CIFS [FIGURE 3]

While file uploads don't benefit from acceleration as much as downloads, the benefits still can be substantial. Uploads from clients to servers moved as much as 33 times faster with acceleration than without it. As with downloads, the greatest benefits came on lower-speed T-1 links, although all the speedups were significant.



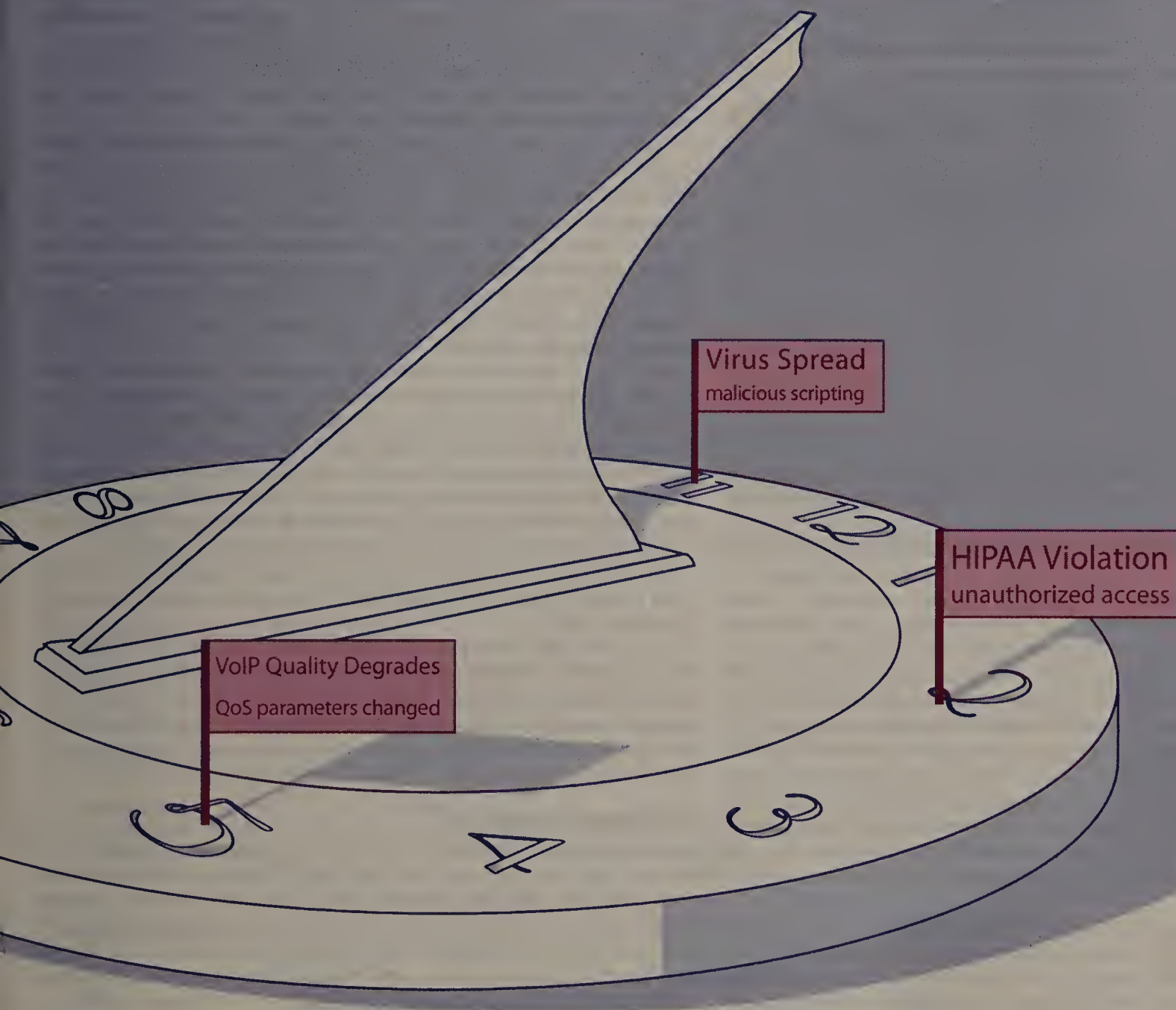
A faster Web

We measured acceleration of HTTP traffic in two tests, one with 248 and one with 2,480 concurrent users. The results were a bit surprising: While the products delivered Web traffic as much as seven times faster than a baseline test without acceleration, performance didn't necessarily improve as we added more users.

To avoid overloading the sites on slower links, we put proportionately fewer users at the T-1 sites than at the T-3 sites. For example, our 2,480-user test involved 1,200 clients at each of two sites on a T-3, and 40 clients at each of two sites on a T-1. We used Spirent Communications' Avalanche/Reflector tool to emulate Web

See App acceleration, page 50

Turn back network time.



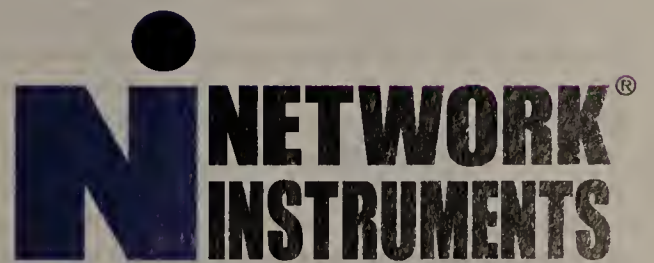
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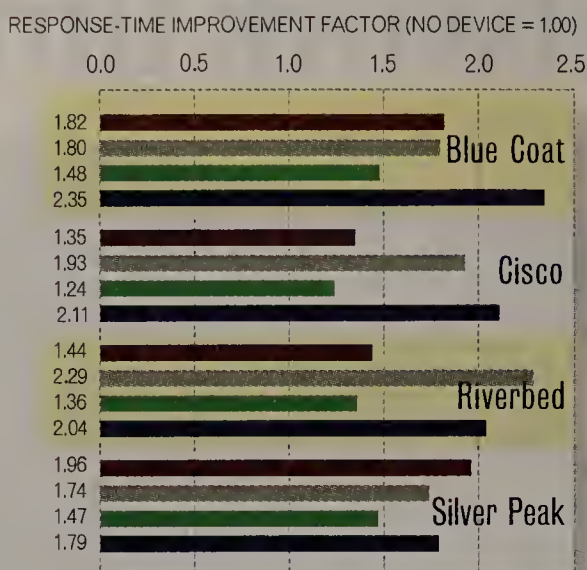


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CLEAR CHOICE TEST APPLICATION ACCELERATION

MAPI acceleration [FIGURE 4]

The MAPI e-mail protocol showed lower but still significant improvement in our tests compared with CIFS file traffic. Differences between products also were much smaller. This may be tied to our use of Outlook 2007 clients, which by default enable encryption of e-mail contents, giving appliances fewer opportunities for optimization.



■ HIGH BANDWIDTH, HIGH DELAY ■ HIGH BANDWIDTH, LOW DELAY
■ LOW BANDWIDTH, LOW DELAY ■ LOW BANDWIDTH, HIGH DELAY

App acceleration

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clients and servers. Because previous studies of Web objects place the average size at 8K to 13KB, we configured the clients to request an 11KB object from the servers.

As in the CIFS and MAPI tests, the Riverbed Steelhead appliances delivered Web traffic the fastest (see graphic, "Web acceleration," at www.nwdocfinder.com/9921). In all three ways we measured — transactions per second, traffic rates and response time — the Steelhead appliances delivered Web traffic seven times faster than tests with no device inline. We observed the same seven-times improvement with 248 and 2,480 users; because LAN and WAN bandwidth use was almost identical in each test, it's likely that WAN bandwidth was the bottleneck.

Blue Coat's SG appliances were second-fastest, but that result must be stated with a caveat: The Blue Coat boxes worked better with fewer Web users, not more. Compared with no acceleration, the Blue Coat appliances boosted Web performance by around seven times for 248 users, but by around six times for 2,480 users (and that's just for transactions per second and data rate; the response time improved by only a factor of three).

We noticed some erratic Address Resolution Protocol (ARP) behavior in tests involving 2,480 users when Blue Coat forwarded either Web or SSL traffic (see "What about SSL?" at www.nwdocfinder.com/9922). Although Blue Coat replicated our issue in-house and produced a software fix (now available to customers), we still observed sluggish behavior in the 2,480-user tests after applying the update.

Silver Peak's NX appliances were third-fastest, tripling transaction and data rates and reducing response time by around 2.5 times when handling 248 users. With 2,480 users, performance dipped slightly (by about the same margin as Blue Coat's appliances), though traffic still moved substantially faster than in our no-device baseline test. Silver Peak says these results are roughly in line with its in-house testing.

Cisco's WAE appliances better than doubled performance with 248 users, and more than tripled performance with 2,480 users. Cisco's WAE devices don't proxy Web traffic as they do with CIFS, so the performance improvements here are largely attributable to TCP optimizations.

QoS testing

QoS testing revealed some of the most interesting — and in some ways most problematic — results of all our performance testing. While three of four products did a virtually perfect job of prioritizing traffic, the path

there was anything but straightforward, involving much tuning — and in some cases external devices to protect key flows during congestion.

To measure QoS capabilities, we offered a small amount of high-priority traffic — in this case, a single VoIP call, which is sensitive to delay and jitter — while walloping the WAN with huge amounts of background traffic. We used User Datagram Protocol (UDP) for both high- and low-priority flows; VoIP uses UDP by default, and TCP was not suitable as background traffic, because of its built-in congestion control.

We also determined whether devices could "re-mark" Diff-Serv code points (DSCP), a good practice in guarding against rogue users or applications marking their flows with an inappropriate priority.

Blue Coat's SG appliances couldn't participate in this test because they don't optimize UDP traffic. The other vendors turned in excellent results but used different paths to get there.

Cisco recommends using WAN routers (in this case, the Cisco 3845 and ISR 2800 Series devices it supplied) rather than application accelerators for shaping traffic. Cisco's WAAS acceleration devices and routers work together using network-based application recognition (NBAR). We verified in testing that flows the acceleration devices classified using NBAR will be prioritized by the routers during congestion. The routers turned in great results; the ClearSight analyzer measured R-value, an audio-quality metric, as 92.03 out of a possible 93, and they correctly re-marked DSCPs.

Note that ultimately Cisco's entry performed prioritization on its routers, not on the application-acceleration devices, although the latter did play a role in classifying traffic. This differs from the Riverbed and Silver Peak devices, which performed prioritization on board. Many network managers already run QoS on WAN routers, and for them handing off this function to a router isn't a big deal. For users just getting started with QoS, it may be simpler to set it up on application-acceleration devices, and leave routers alone, at least for now.

The Riverbed and Silver Peak appliances also protected voice traffic, with R-value scores of 91.80 and 90.07, respectively, and both correctly re-marked DSCPs.

Of the two, the Silver Peak NX appliances were easier to configure. They correctly classified VoIP streams and shaped traffic according to the parameters we defined. Riverbed's Steelhead appliances don't classify real-time protocol streams automatically, and a bug in the software version we tested wouldn't let us manually define port ranges. Instead, we used other criteria, such as source address, to classify VoIP streams.

Concurrent connections

Our final performance test determined the maximum number of TCP connections each system could optimize. This is an important metric for enterprises with many remote offices and hub-and-spoke network designs, where connection counts for data-center devices can run into the tens of thousands. All the devices we tested get into that tens-of-thousands range, but there was more than a fourfold difference between the highest and lowest capacities.

To measure connection concurrency, we configured Spirent's Avalanche to issue a Web request once a minute, letting us establish and keep many connections alive. We added connections until transactions began to fail or the devices stopped optimizing new connections.

Cisco's new WAE-7371 came out tops in this test, accelerating more than 50,000 TCP connections (see graphic, "Maximum accelerated TCP connections," at www.nwdocfinder.com/9921). Silver Peak's NX appliances were next, optimizing 43,306 concurrent connections. This is well short of the NX 7500's rated capacity of 128,000 optimized connections, a level that Silver Peak achieved in internal testing. We were unable to reproduce that result in our lab, and, despite extensive troubleshooting, neither we nor Silver Peak's engineers were able to

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CLEAR CHOICE TEST APPLICATION ACCELERATION

explain the difference. The Blue Coat SG appliances were next, handling about 19,500 optimized connections.

Riverbed's Steelhead 5520 optimized more than 12,200 connections, but that result reflects the limits of the two Steelhead 3520 units through which we set up connections. Riverbed says the higher-end 5520 model can optimize 15,000 connections. We were unable to confirm that result, but our tests did show that each 3520 slightly outperformed its rated limit of 6,000 connections to get to the 12,200 total mentioned previously.

Features and functioning

Most testing focused on performance, but we also assessed devices for functioning, manageability and usability. Each of these areas turned up at least as many differences as the performance tests did.

All acceleration devices reduce the number of bits sent across the WAN, but they do this in very different ways. The Blue Coat and Cisco devices act as proxies, terminating connections between clients and servers and setting up new sessions on their behalf. Riverbed's devices can proxy traffic, though the vendor did not enable that feature for this test. Silver Peak's NX appliances don't proxy traffic.

Transparency is another architectural difference. Blue Coat and Silver Peak engineers respectively configured SSL or generic routing-encapsulated tunnels between appliances, and Riverbed can use SSL tunneling. Tunneling may pose a problem if other inline devices, such as firewalls or bandwidth managers, need to inspect traffic.

Cisco claims this is a major differentiator for its WAAS offering, which doesn't hide traffic from other devices and automatically learns about new traffic types from other Cisco devices using NBAR. A powerful classification engine, NBAR in our tests classified even applications using ephemeral port numbers, such as those used for H.323 and Session Initiation Protocol. Silver Peak's appliances also classified such traffic. Then again, transparency isn't an issue for users who don't

need application visibility among acceleration devices.

Application support also varies, but it's less important a differentiator than performance, manageability and usability. It's tempting — but also a bit misleading — to compare the number of predefined application types each vendor claims to optimize. First, the applications involved are important only if they're running in your enterprise. Second, acceleration devices still may boost performance even if a given application isn't predefined, thanks to compression and TCP optimization. Finally, all devices we tested allow manual definition of new application classes based on addresses and port numbers (though these may not be subject to the same speedups as some predefined types).

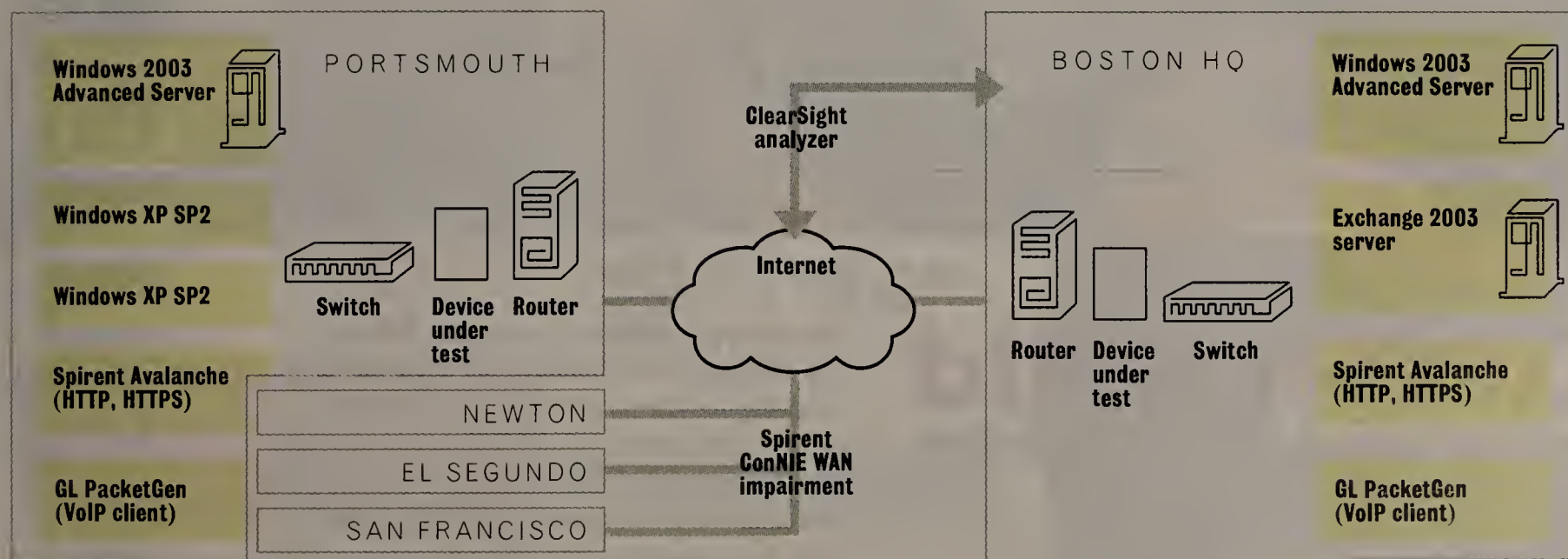
See App acceleration, page 54

Thanks

Network World gratefully acknowledges the assistance of the many suppliers of test-bed infrastructure that made this project possible. Software developer Joe Perches wrote custom scripts for this test to measure Common Internet File System and Messaging API performance. ClearSight Networks supplied a hardware-based version of its gigabit analyzer. Spirent Communications supplied its Converged Network Impairment Emulator, which we used to emulate WAN links, as well as its Avalanche and Reflector appliances for Web, SSL and concurrent-connection testing. GL Communications supplied its PacketGen VoIP test software for generating calls in the QoS test. And Apcon supplied its Intellapatch virtual patch panel system to tie together all systems tested.

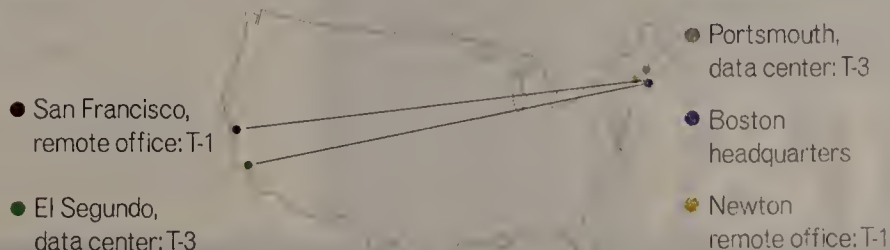
The physical test bed

The physical test bed used real Windows clients and servers at each site for CIFS and MAPI testing, Spirent Communications' Avalanche/Reflector system for HTTP and SSL testing and GL Communications' PacketGen for VoIP traffic. We measured LAN and WAN traffic with ClearSight Networks' Network Analyzer and emulated WAN conditions using Spirent's Converged Network Impairment Emulator.



The logical test bed

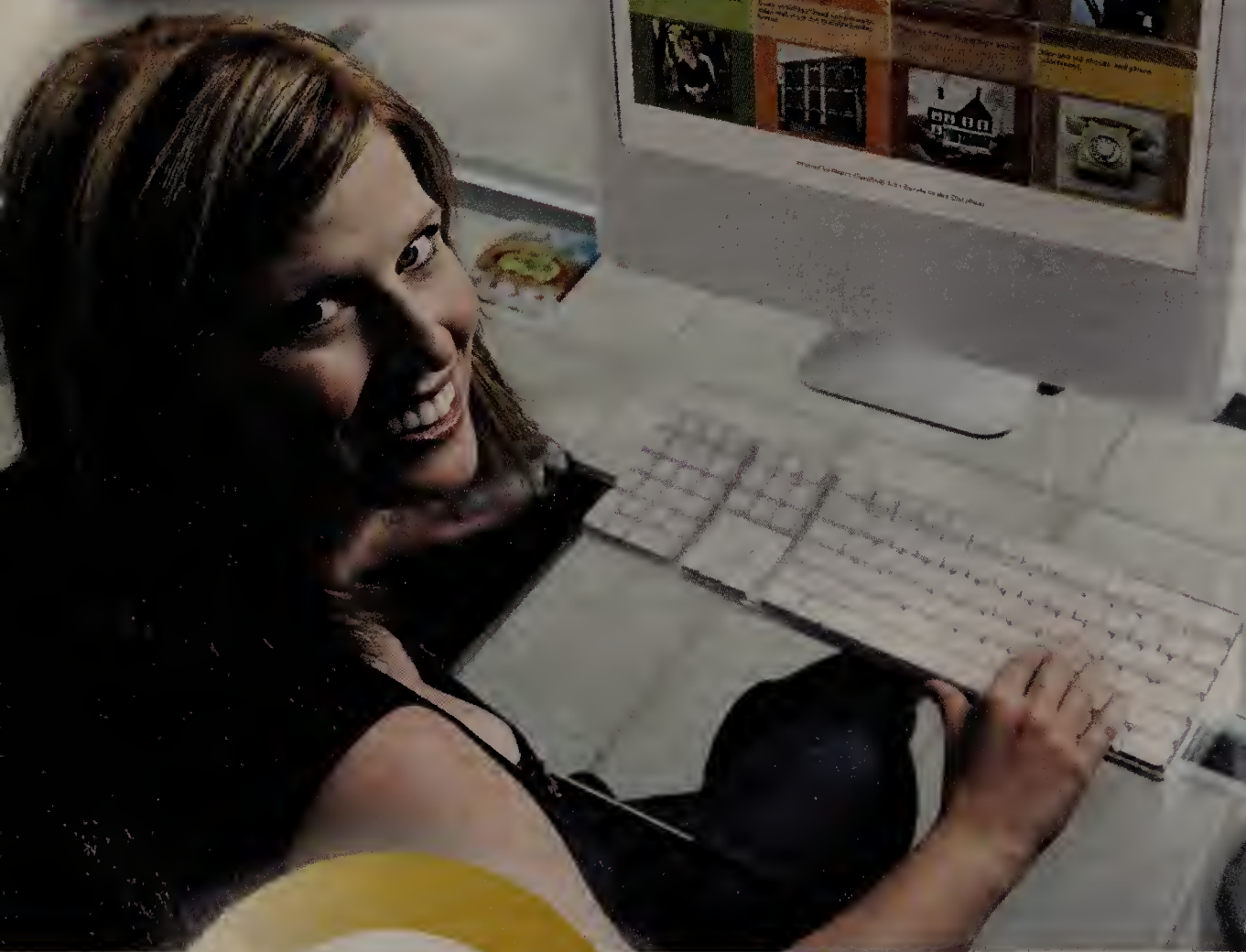
To test application acceleration, we built a test bed modeling an enterprise network with five sites: A headquarters in Boston and remote offices in Portsmouth, N.H.; Newton, Mass.; El Segundo, Calif.; and San Francisco. Two T-3 and two T-1 links connect the sites.



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App acceleration

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To look after all the devices in our test bed's enterprise, we asked each vendor to supply a central management system.

We assessed centralized management in terms of functioning and reporting features. On the function side, all vendors but Blue Coat offer a centralized method of pushing out configuration changes or software upgrades to all appliances. Blue Coat indeed can push changes and upgrades but only by manually defining a job to push out the change. All vendors allow appliances to be defined into groups (though Blue Coat's Director appliance requires a manually defined job to perform an action on a given group).

All devices use a dashboard display to show application distribution and volume during predefined periods. These displays can be very helpful in managing application traffic even before acceleration is enabled. It's pretty common to find during installation that enterprises are running applications they didn't know about. Once acceleration is enabled, these devices use pie charts and bar graphs to report on compression, percentage of optimized vs. pass-through traffic and data reduction.

The Cisco, Riverbed and Silver Peak appliances aggregate displays across multiple devices, a useful feature for capacity planning. There

were differences in terms of the application data and time periods supported; for example, Silver Peak's display was useful in troubleshooting because — uniquely among the products tested — it reported on packet loss and did so in per-minute intervals.

There are significant usability differences among the accelerators, but we'll be the first to admit

this is a highly subjective area. If we had to rank the systems in terms of ease of use, the lineup would be Riverbed, Silver Peak, Cisco and Blue Coat.

Riverbed's Steelhead appliances came closest to the goal of "just working." Setup took less than half a day. Once we were up and running, we found the user interface to be simple and well designed. It was easy to make changes and view reports, even without delving into the company's well-written documentation.

Silver Peak's NX appliances also feature a simple user interface with excellent reporting on current and historical statistics. The central management display wasn't as polished or fully featured as Riverbed's, although unlike Riverbed's, it includes a topology map of all appliances.

Cisco's display bristles with features and commands — perhaps too many. Cisco's redesigned dashboard offers whizzy graphics, useful pie charts on CIFS application performance and (like Riverbed and Silver Peak devices) real-time connection monitoring and per-device reporting on connection statistics. Getting to specific commands or opening logs often took more steps than with other devices, however; further, not all the commands available from the device command line were available from the GUI, and vice versa.

Blue Coat's management software, while powerful, was the most difficult to use. Individual appliances used a Web-based Java application that was sluggish; further, it worked with Internet Explorer but not Firefox. And some predefined tasks in other vendors' devices, such as updating configuration or images, required manual definition in the Blue Coat devices, or touching each appliance individually.

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How we did it

Our test bed (see graphic, page 51) modeled an enterprise hub-and-spoke network with five sites: A headquarters in Boston and branch offices in Portsmouth, N.H.; Newton, Mass.; El Segundo, Calif.; and San Francisco. We used Spirent Communications' Converged Network Impairment Emulator to emulate WAN rates and delays. The Newton and San Francisco remote links ran at T-1 (1.5Mbps) rates, while the other two ran at T-3 (45Mbps) rates. The Newton and Portsmouth links used 16-msec round-trip delays, while the other two used 100-msec round-trip delays.

We measured application-acceleration performance with Common Internet File System and Server Message Block Windows file transfers, Outlook and Exchange, HTTP, and SSL traffic. We also assessed devices' QoS capabilities by generating VoIP traffic while loading the network with HTTP traffic.

To measure bandwidth reduction, we used a ClearSight Networks hardware-based analyzer with taps in the Boston LAN and WAN sides of the test bed. To measure application response time, our custom-built software measured CIFS and Messaging API (MAPI) transfers.

For the CIFS file transfers, two clients at each remote site simultaneously sent and received Microsoft Word documents from the Boston site. Clients on T-3 links transferred 750 files each way, while clients on T-1 links transferred 25 files each way. We ran each CIFS test three times: a "cold run" with empty device data stores, a "warm run" once the data store had been populated and a "10% run," in which we altered the contents of 10% of the files.

To measure MAPI and Exchange performance, Outlook 2007 on each client created 1,000 or 34 messages for T-3 or T-1 circuits, respectively. Each client sent messages to all other clients, but always through an Exchange 2003 server at the Boston site.

To measure HTTP performance, we configured the Spirent Avalanche and Reflector 2500 appliances to emulate Web clients and servers, respectively. As many as 2,048 clients at remote sites requested 11KB objects from servers at the Boston site. We measured HTTP response time and transfer rates. We repeated these tests twice, once with 256 clients across all remote sites, and again with 2,048 clients.

To measure SSL performance, we repeated the HTTP tests using Secure-HTTP, loading server certificates on the acceleration devices where they support SSL proxying.

To assess devices' QoS capabilities, we simultaneously offered small amounts of VoIP and large amounts of HTTP traffic. To generate and measure VoIP traffic, we used GL Communications' PacketGen and VQT products to set up and measure Session Initiation Protocol and RealTime Protocol calls. We again used Spirent Avalanche and Reflector for HTTP traffic. In these tests, we compared VoIP audio-quality measurements with and without HTTP present. As an added test of QoS, we checked whether devices could classify and re-mark the Diff-Serv code points for voice and Web traffic.

We also measured the maximum TCP connection capacity of the Boston device. In this test, the Avalanche appliance emulated a Web client requesting a 1KB object every 60 seconds. We attempted to measure a maximum connection count supported by the Boston appliance to the nearest 1,000 connections.

Much of our assessment for functioning, manageability and usability occurred during the performance tests.

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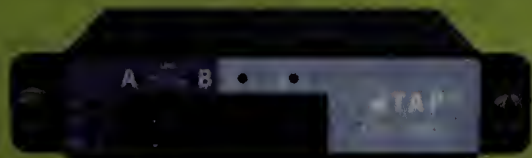
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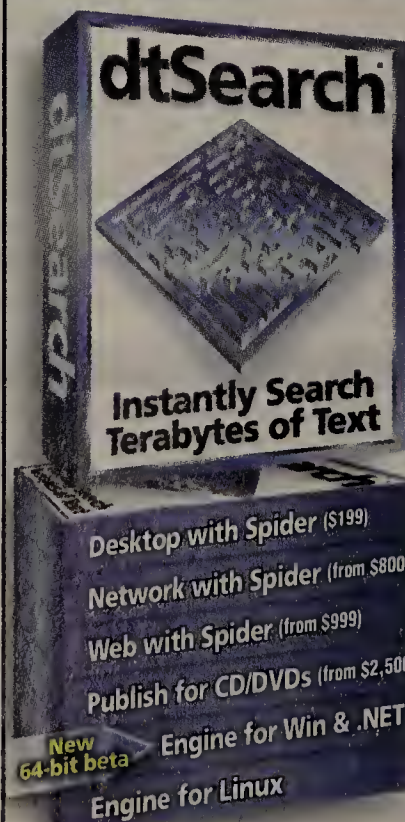
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Cisco

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the first company Cisco acquired.).

"The internal venture framework is an inexpensive way to get the same result" as a spin-in, De Beer says.

The *Harvard Business Review* recently lauded Cisco's strategy as a model for established companies looking to harvest new markets to augment their core business. The HBR cited Cisco's ability to keep its internal, start-up resources isolated from its core routing and switching businesses and thereby focused on mid- and long-term growth opportunities — not to bail out the core business in order to meet quarterly targets.

But Cisco is not unique in this effort. IBM three years ago created a new internal unit — called Strategic Growth Initiatives — to target emerging markets. That unit combines IBM's Linux, grid computing and virtualization initiatives, among others.

Alcatel-Lucent has Bell Labs, and Red Hat and Network Appliance also have internal emerging-technology initiatives.

Cisco's may be unique, however, given the company's penchant for going outside to obtain and staff its emerging technologies efforts. Cisco has bought about 114 companies since the Crescendo acquisition in 1993.

Cisco weighs making vs. buying

"The make-vs.-buy decision is something that probably comes up more often in Cisco than in IBM," says Dave Passmore, research director at The Burton Group. "An IBM would tend to pursue more internal developments, whereas Cisco might always be thinking, 'How much of this should we do ourselves?'"

Passmore says there are benefits and drawbacks to both approaches. Companies can readily drain resources from internal efforts to meet a short-term goal. Conversely,

a heavy reliance on acquiring outside technology and talent can create a culture clash, leading to an exodus of skilled personnel.

"There's the control issue, and the fact that you can lose a bid for an outside company. The technology can land in 'the wrong hands,'" Passmore says. "When you've got a lot of entrepreneurs that you hire through acquisition, those are the kinds of people who tend to want to go off and do what they want to do. They're not exactly company men."

Passmore notes that Cisco has been adept at retaining top talent after acquiring a company.

Cisco's first such emerging market internal start-up was its IP telephony effort — phones and PBXs — in the late 1990s. Since then, several such internal start-up activities have stocked Cisco's Advanced Technologies operations, a conglomerate of \$1 billion markets and product lines that include unified communications, storage, security, wireless, home networking, application services and video.

Linuxworld

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"ISVs would be able to certify an application and seamlessly port it across Linux distributions," he said.

Hovsepian was short on details, but there are similar projects underway including the Linux Standard Base, which Novell supports, and the Open Solutions Alliance, which promotes development of common APIs.

Hovsepian also said Linux needs to focus on virtualization, management, security and power management. "These are critical components as to where and how the next generation of data centers evolve," he said.

While these new areas of focus are being explored, those closest to the heart of the matter — the Linux kernel — are not stopping to pat themselves on the back.

"It looks like we have a battle on two fronts now, one with Microsoft and one with

Sun," said James Bottomley, a Linux kernel developer and vice president and CTO of SteelEye Technology. The Sun tiff in part has revolved around its OpenSolaris initiative and how it might license its ZFS file system. Linux kernel stewards, including Linus Torvalds himself, believe Sun wants to take from the Linux community and not give back via open source licensing.

"Sun wants to have an innovation model that mirrors Linux and not give away the keys [by open sourcing]. I find that is an impossible goal," Bottomley said.

Despite the back-and-forth, the belief is that Linux has seized a place as a corporate platform, and if the next steps can be executed with the same level of competence, the potential is unlimited.

"The interesting thing across all these areas of growth is that you have this unifying Linux underneath," said Jim Zemlin, executive director of the Linux Foundation. ■

TelePresence

The latest such emerging-market technology to be turned into products is Cisco's video-based TelePresence virtual meeting system. Unveiled last fall, Cisco has shipped 110 TelePresence systems to date to 50 customers and expects it to be another \$1 billion opportunity within the next five years.

Other recent market entrants from Cisco's Emerging Technologies Group include the IP Interoperability and Communications System for emergency first-responders; physical security; and digital media systems for enterprises. De Beer says there are at least four more emerging technologies "in the pipeline" and even more in the pre-pipeline stage. He declined to identify them.

The 400-person staff of the Emerging Technologies Group fields ideas for new market entries submitted by Cisco employees through the company's intranet. The group's goal is to fund 15 new \$1-billion market initiatives over five years, De Beer says — roughly a 2% hit rate on all of the ideas submitted. ■

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BACKSPIN

Mark Gibbs

Manners maketh the mail

Last week my esteemed colleague below me on the back page discussed e-mail etiquette and his intense irritation with people who prethank — that is, who thank you in their initial message before they know how you'll respond to whatever their message is about and then when and however you reply they, in turn, reply by thanking you again.

Now, by a curious coincidence, I also was thinking about manners this week. What constitutes the behaviors we refer to as manners has changed remarkably throughout human history, and what one period in history considered acceptable another considered to be gross and vile. In the beginning (about 1.8 million years ago), there were no manners at all, and for several millennia the height of good manners was apparently pretty much concerned with not killing each other.

Manners had improved considerably by the mid-1500s. The Dutch humanist Erasmus was provoked by who knows what to advise that "it is impolite to greet someone who is urinating or defecating. A well-bred person should always avoid exposing without necessity the parts to which nature has attached modesty. If necessity compels this, it should be done with decency and reserve, even if no witness is present."

Civility took a few more faltering steps forward, and in 1744 George Washington advised schoolboys (www.nwdocfinder.com/9970) to "Kill no Vermin as Fleas, lice ticks in the Sight of Others, if you See any filth or thick Spittle put your foot Dexterously upon it if it be upon the Cloths of your Companions, Put it off privately, and if it be upon your own Cloths return Thanks to him who puts it off."

Manners have changed remarkably over human history.

And on to today, where we have had Emily Post ("proper etiquette"), Miss Manners ("heavy etiquette theory"), and Martha Stewart (promoter of "good things" except where it concerns the etiquette of stock trading ... I still don't think she deserved prison) to tell us how to behave well. All of this working at manners has furthered our culture tremendously but, alas, is only partially applicable to the online world.

The situation described by Paul is a great example of this disconnect, and what the recipient is doing would be totally acceptable if there were days or even hours between messages. When there are seconds, then it all seems too much and folks like Paul are driven to homicidal thoughts in response.

The problem is — to recycle a phrase I haven't used for a while — "Internet time"; the perception that everything, not just technology, has to happen as fast as it can happen because it can and should. More is no longer better. More and faster is better (or perhaps that should be "Moore and faster").

And this is where the Paul's problem lies. Paul wrote, "before I can return my attention to whatever task it had been ripped from to reply, I'll see the ... next message hit my in-box." He's right, we're all getting like that, compulsive e-mail readers. Hang on ... there! I just did exactly that while writing this column!

Anyway, I think there's a simple answer that you can do with just a little effort: Exit your e-mail client and only fire it up once per hour on the hour. You'll deal with your messages and then quit until the next scheduled mail scan. It can be done. An editor I used to know did just that. Of course, he's dead now.

Gibbs (www.gibbs.com/mgbio/) is "at home" in Ventura, Calif. He would be honored to receive your communication



Paul McNamara

NETBUZZ

News, insights, oddities

3 surveys say a lot, most of it unflattering

A "State of the Net" survey released last week by *Consumer Reports* makes clear that Americans continue to have ample cause to distrust Internet interactions ... yet many remain woefully ignorant in terms of protecting themselves — and their children — from the most obvious dangers.

The combination has cost consumers \$7 billion over two years, according to *Consumer Reports*.

The sweeping study does include nuggets of good news, however, including a contention that less spam is hitting consumer in-boxes. No one asked me. Among the findings:

- Computer viruses have prompted 1.8 million households to junk their PCs over the past two years, while spyware has claimed another 850,000 machines in just the past six months.
- Not surprisingly given those numbers, 17% of PC users lack virus protection and a third of respondents fail to guard their machines against spyware.
- Extrapolating from the survey results, about 650,000 people have bitten on a spam-promoted product or service offerings over the past six months, a figure to keep in mind next time you wonder why spammers even bother.
- Five percent of those surveyed who have children under the age of 18 report that their kids have inadvertently been exposed to pornography through spam, while the *Consumer Reports* press release made no mention of how many kids opened smutty spam on purpose.
- While lawmakers continue to hound MySpace 24/7, we learn that not all parents are worried sick over the notion that Junior or Missy may be divulging too much 411 online: Among respondents whose kids go online, 13% of the youngsters registered on MySpace failed to

meet the site's 14-year-old age minimum, and 3% were younger than 10. As the press release notes: "And those were just the ones the parents knew about."

89% say ban texting while driving

Finally, something about which roughly nine in 10 Americans can agree: Text messaging while under the influence of an automobile ought to be against the law.

You generally can't get nine in 10 Americans to agree on the day of the week, never mind a change in the law — and never ever mind a change in the law that would have a direct impact on them.

Of course, those nine out of 10 are not exactly practicing what they preach at the moment, as 57% of those who drive and also send text messages admit to doing the two simultaneously. If you're talking about merely reading text messages, that number jumps to a full 6%.

The survey of 2,049 adults was conducted by Harris Interactive.

The state of Washington this spring became the first to ban texting while driving and some half-dozen others have similar legislation pending. Expect Congress to act soon.

Ask and ye shall ...

So how do you get a secret username and password out of an IRS employee? Turns out you need only ask.

A government inspector called 102 IRS folks, claimed to be in need of help solving a computer problem, and asked for their username and that they temporarily change their password to one suggested by the inspector. Sixty-one complied.

These people know all there is to know about our personal finances, yet seem incapable of locking a door.

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